

STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7314

Joint Petition of Vermont Transco, LLC, Vermont)
Electric Power Company, Inc. ("VELCO"), City of)
Burlington Electric Department ("BED") and Green)
Mountain Power Corporation for a certificate of public)
good, pursuant to 30 V.S.A. Section 248, authorizing the)
construction of the so-called East Avenue Loop Project)
in Williston, South Burlington, Colchester, Winooski)
and Burlington, Vermont, which consists of: (1) the)
replacement of 4.8 miles of an existing single 115 kV)
line between VELCO's Essex Substation and its East)
Avenue Substation with two new 115 kV lines within)
the same corridor; (2) expansion of the East Avenue)
Substation; (3) installation of a new 1.5-mile 34.5 kV)
line from the East Avenue Substation to BED's McNeil)
Substation; (4) construction of a new substation at the)
McNeil Generating Station; (5) installation of new and)
relocated equipment from BED's Lake Street Substation)
to the McNeil Substation; and (6) removal of several)
circuits connected to BED's Lake Street Substation)

Hearings at
Montpelier, Vermont
March 6 and 10, 2008

Order entered: 5/29/2008

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I. INTRODUCTION

In this proceeding, Vermont Electric Power Company, Inc., and Vermont Transco, LLC (collectively, "VELCO"), Green Mountain Power Corporation ("Green Mountain Power"), and the City of Burlington Electric Light Department ("BED") (collectively, the "Petitioners") have proposed the following transmission upgrades, hereinafter referred to as the East Avenue Loop Project ("EAL" or "Project"):

- Replacement of the existing 4.8-mile 115 kV line¹ in the 150-foot VELCO right-of-way ("ROW") between VELCO's Essex substation and its East Avenue substation (in Burlington) with two new 115 kV lines;
- Expansion of the existing East Avenue substation adjacent to Centennial Field to 110' x 376.5' to accommodate new equipment, including three transformers, four circuit breakers, and a new control house;
- Installation of a new 1.5-mile 34.5 kV line from the East Avenue substation to the BED substation at the McNeil Generating Station (located off Intervale Road in Burlington), with most of the new line to be installed underground from Centennial Road to just west of Colchester Avenue, and along the existing underground conduit on Riverside Avenue until Intervale Road; and
- Construction of a new substation within the existing BED McNeil substation that will accommodate an existing transformer to be relocated from BED's Lake Street substation, a new 15 kV metal enclosed modular substation, and three circuit breakers.

The Project will also allow the removal of several BED 13.8 kV circuits connected to BED's Lake Street substation, including the overhead lines that span the Burlington Waterfront Park.

The EAL study area covers the City of Burlington and the surrounding Chittenden County area — South Burlington, Williston, Colchester, Winooski, Essex, Richmond, and Bolton. The present electric sub-transmission and distribution network in the EAL Chittenden County area

1. While the existing support structures consist of wooden H-frames, the new support structures will be predominantly single-pole davit arms.

cannot provide adequate and reliable electric service to the customers served in that area. Under the present system configuration and loads, significant amounts of Chittenden County's electric load — including critical facilities like Fletcher Allen Health Care, the University of Vermont and its research facilities, the City of Burlington water and wastewater processing facilities, and the City of Burlington downtown commercial core — may be lost under a number of single contingency scenarios, including loss of the single East Avenue substation 115/13.8 kV transformer or loss of the single 115 kV K-25 line that is the sole radial connection between the East Avenue and Essex substations.

The East Avenue Loop Project addresses these serious reliability problems. The Project will provide a redundant delivery supply point to East Avenue so that power is not instantaneously lost for failure of critical facilities, and will also provide necessary reinforcement to the sub-transmission and distribution network in this area.

The proposed Project, as conditioned by this Proposal for Decision, will enhance electric reliability for the area and will not result in any undue adverse impacts under any of the substantive criteria of 30 V.S.A. § 248(b). Consequently, I recommend that the Board approve the Project as conditioned below.

II. PROCEDURAL HISTORY

A prehearing conference was held on June 8, 2007. The City of South Burlington and the Division for Historic Preservation of the Agency of Commerce and Community Development were permitted to intervene without objection of any party at the prehearing conference. Winooski Valley Park District ("WVPD") was granted intervention following the prehearing conference.

A site visit and public hearing were conducted on July 10, 2007. Two members of the public spoke, both of whom were concerned about the possibility of additional distribution lines being installed in their neighborhoods. However, the proposed project does not include additional distribution facilities.

Technical hearings were held on March 6 and March 10, 2008. All prefiled testimony and exhibits admitted into the record were admitted without objection and without

cross-examination. Among the exhibits was a Memorandum of Understanding between the Petitioners, the Winooski Valley Park District, and the City of South Burlington, which I propose the Board accept. On April 18, 2008, the Petitioners filed a complete proposed decision, order, and certificate of public good. While the Petitioners described the proposal as a "consensus of the Parties," the Parties did not waive service of this Proposal for Decision pursuant to 3 V.S.A. § 811.

III. FINDINGS

Based on the evidence of record and the testimony presented at hearing, I hereby report the following findings to the Public Service Board ("Board" or "PSB") in accordance with 30 V.S.A. § 8.

A. Overview of Need for Project

1. The EAL study area covers the City of Burlington and the surrounding Chittenden County area — South Burlington, Williston, Colchester, Winooski, Essex, Richmond, and Bolton. LaForest pf. at 6; exh. VELCO-PET 1.2.

2. VELCO, which owns, operates, and plans for the State of Vermont's high-voltage electric transmission system (115 kV and above), has delivery points in the EAL study area that serve both BED and Green Mountain Power electric load, at the VELCO Essex, East Avenue, Queen City, and Taft Corners substations. LaForest pf. at 6.

3. Green Mountain Power owns and operates the 34.5 kV subtransmission electric system in Chittenden County, which surrounds the City of Burlington, providing service to electric customers in South Burlington, Williston, Colchester, Winooski, Essex, Richmond, Bolton, and approximately one-third of the City of Burlington electric load. Cecchini pf. at 3.

4. The most recent summer peak load (2006) for this part of the Green Mountain Power electric system was approximately 165 MW. *Id.*

5. Green Mountain Power's 34.5 kV network for this area takes supply from the VELCO Essex, Queen City, and Tafts Corners substations and transmits power to both its local distribution stations as well as BED's Lake Street substation. VELCO delivers power to Green

Mountain Power's 34.5 kV sub-transmission system by means of one 56 MVA, 115/34.5 kV transformer at the Taft Corners substation, and two 50 MVA, 115/34.5 kV transformers at the Essex substation. LaForest pf. at 7; Cecchini pf. at 3–4.

6. VELCO delivers power to BED's 13.8 kV distribution system that serves the City of Burlington by means of one 50 MVA, 115/13.8 kV transformer at the Queen City substation, and one 50 MVA, 115/13.8 kV transformer at the East Avenue substation. BED has a third delivery point from the Green Mountain Power 34.5 kV system through a 33 MVA, 34.5/13.8 kV transformer at the Lake Street substation, which is located on the Burlington Waterfront. LaForest pf. at 7; Kasti pf. at 3.

7. Each of the BED substations (East Avenue, Queen City, and Lake Street) supplies one 13.8 kV sub-system, each of which is isolated from the other two sub-systems. In other words, under normal conditions, each of the three BED sub-systems is operated as an island. LaForest pf. at 8; Kasti pf. at 3–4.

8. Nearly half of BED's load, approximately 70 MW at peak, is supplied by the radial Essex to East Avenue 115 kV transmission line (the so-called K-25 line), and by the single 115/13.8 kV East Avenue substation transformer located at the end of this line. Because the transmission line is radial, any fault on this line necessarily results in an instantaneous loss of the East Avenue substation load. Litkovitz pf. at 2; LaForest pf. at 11.

9. Similarly, because there is only one transformer at the end of the K-25 line, a contingent loss of the transformer also results in an interruption to the load supplied. *Id.*

10. Under the present transmission supply configuration, loss of either the K-25 transmission line or the East Avenue substation transformer results in service interruption to approximately 40% to 50% of BED's distribution load for as long as 1.5 hours, while load is being switched between the two remaining substations. This interruption would adversely affect critical facilities like Fletcher Allen Health Care, the University of Vermont and its research facilities, the City of Burlington water and wastewater processing facilities, and the City of Burlington downtown commercial core, including the Church Street Marketplace. However, when load exceeds 59 MW the ability to restore all load is lost. Under this scenario, during summer 2006 peak load conditions about 12 MW (17% of BED's distribution system peak load)

could not have been served even after the load switching was completed. Kasti pf. at 3–5; LaForest pf. at 11–12; Litkovitz pf. at 3.

11. This situation with BED's East Avenue loads is the only one in Vermont in which such a large amount of dense, urban load is vulnerable to a single contingency. Litkovitz pf. at 3.

12. Also of significant concern is the exposure of Green Mountain Power's Chittenden County loads, which total approximately 165 MW at peak. The worst case scenario is the loss of an Essex transformer during the peak period with McNeil generation out of service. If this event occurred the remaining Essex transformer would be overloaded. Every effort would be made to put on uncommitted generation, transfer load, and shed selected load to bring the load on the remaining Essex transformer to an acceptable level. However, if these mitigating actions could not be successfully completed in a relatively short time, or if events were accompanied by misoperation of protection systems, all 165 MW of load would be lost. This load includes approximately one-third of the City of Burlington load served at the Lake Street substation. Cecchini pf. at 4; LaForest pf. at 12; Kasti pf. at 4–5; Litkovitz pf. at 3.

13. This reliability exposure exists at present peak loads and would be exacerbated as loads increase. Litkovitz pf. at 3–4.

14. In addition, while less critical than the contingencies noted above, there are portions of Green Mountain Power's 34.5 kV subtransmission system in Chittenden County that are vulnerable to overloads, low voltages, and loss of load following single transmission-line contingencies. Litkovitz pf. at 4.

15. Green Mountain Power's 34.5 kV system is susceptible to outages on its 3307 and 3308 lines between the Essex and Gorge substations. These lines are on shared H-Frame structures and subject to a common mode failure. Outage of these lines would shift Green Mountain Power's northwest area load onto the Queen City transformer and would overload the 3323 and 3328 lines between Queen City and McNeil (that is, the Burlington Waterfront lines) causing load shedding. Cecchini pf. at 5.

16. BED also has loss-of-load exposure for other potential substation transformer contingencies. Loss of both 115 kV lines feeding the Queen City substation or loss of the Queen City substation transformer results in service interruption to approximately 30% of BED's load,

for as long as 1.5 hours, while load is being switched between the two remaining substations. Under this scenario, during summer 2006 peak conditions, about 7MW (10% of BED's distribution system peak load) could not have been served after the load switching was completed. Kasti pf. at 5–6.

17. While VELCO's Queen City substation, another BED supply point, will be supplied by two 115 kV lines upon completion of the Northwest Vermont Reliability Project, these lines share the same pole for 7 structures, or approximately 2,800 feet. As a result of this design, BED's Queen City substation source will remain vulnerable to extended loss of load during peak load periods for certain transmission-line contingencies, i.e., loss of both lines or tower failure. Kasti pf. at 5; exh. PET 2.3.

18. Transformer failures at the Essex and other VELCO substations have occurred in the past. For example, in the Spring of 2006 (when load levels were well below peak) the Queen City 115 kV/13.8 kV transformer failed. This resulted in the instantaneous loss of all BED's Queen City load until the load was switched to the remaining two substations (East Avenue and Lake Street). LaForest pf. at 12; Litkovitz pf. at 4.

19. Another recent failure occurred on March 18, 2007, when the K-25 line (Essex to East Avenue 115 kV) tripped out due to contact with a UVM snow removal truck. The ROW for the K-25 line was being used by UVM for snow removal and dumping, following extensive snowfalls during February and March of 2007. These activities decreased the clearance from ground to the energized 115 kV line, contributing to the event. LaForest pf. at 12.

20. During the March 18, 2007, event, all BED customers fed from the East Avenue substation, including UVM and Fletcher Allen Hospital, lost service and had to be reconnected via remote stations. LaForest pf. at 12–13.

21. The Project addresses these reliability problems. The Project will provide a redundant delivery supply path to East Avenue so that power is not instantaneously lost for critical facilities, and provide necessary reinforcement to the sub-transmission and distribution network in this area. LaForest pf. at 13.

22. This type of proposed network supply (two or more 115 kV transmission supplies to an urban area feeding at least two transformers) is commonplace throughout New England. The

second 115 kV tie between the East Avenue and Essex substations and the second East Avenue transformer will create such a supply system for Burlington and northern Chittenden County. This level of redundancy is warranted for the critical load served in Burlington, Vermont's largest city. LaForest pf. at 13–14; *see* exhs. PET 1.4 and 1.5.

B. Project Components

23. The Project includes the following principal transmission elements, and also will allow removal of electrical facilities along the Burlington Waterfront:

- Replacement of the existing 4.8-mile 115 kV line in the 150' VELCO right-of-way ("ROW") between VELCO's Essex substation and its East Avenue substation with two new 115 kV lines. While the existing support structures consist of wooden H-frames, the new support structures will be predominantly single-pole davit arms;
- Expansion of the existing East Avenue substation adjacent to Centennial Field to 110' x 376.5' to accommodate new equipment, including three transformers, four circuit breakers, and a new control house;
- Installation of a new 1.5-mile 34.5 kV line from the East Avenue substation to the BED McNeil substation (located off Intervale Road), with most of the new line to be installed underground from Centennial Road to just west of Colchester Avenue, and along the existing underground conduit on Riverside Avenue until Intervale Road; and
- Construction of a new substation within the existing BED McNeil substation, which will accommodate an existing transformer to be relocated from BED's Lake Street substation, a new 15 kV metal enclosed modular substation, and three circuit breakers.

LaForest pf. at 8–10.

(1) Component 1 — 115 kV Loop

24. The existing 4.8-mile 115 kV line (the K-25 line) that runs from the Essex substation to the East Avenue substation will be rebuilt from the existing H-frame configuration to primarily a single-pole delta davit-arm configuration to allow room for the construction of a second 115 kV line (with similar single-pole delta davit-arm configuration) to be built within the same ROW. LaForest pf. at 8–9; Ertz, Fossum, Barrett, and Askew joint pf. at 5; exhs. PET 8.2.2, 8.2.3, and 8.2.5.

25. The two new 115 kV lines will be single-circuit parallel lines, a North route and a South route, and will remain predominantly in the existing ROW. The North route runs a total of 4.8 miles from the Essex substation to the East Avenue substation. The South route runs a total of 4.6 miles from the East Avenue substation to Line K-23 located just west of the Essex substation. Ertz, Fossum, Barrett, and Askew joint pf. at 5; exh. PET 8.2.2.

26. The primary structure configuration for each line is single-pole davit-arm construction. The typical tangent structures are direct-embedded wood poles with steel davit arms and suspension insulators. The arms are in a delta configuration, which features two arms on one face of the pole spaced 12 feet apart, and one arm on the opposite face. The poles will be designed to provide a 30-degree shielding angle. Ertz, Fossum, Barrett, and Askew joint pf. at 5–6; exh. PET 8.2.3.

27. The two new lines will utilize H-frame construction in select places due to long distances and line-sag restrictions between some of the poles. Structures N-40 through N-45 and S-40 through S-45 will be H-frame structures. Structures N-41, N-42, S-41, and S-42 will be direct-embedded wood poles. The remaining H-frame structures will be steel on concrete foundations. The H-frame configuration was chosen for these structures because of the long spans across the Winooski River. This configuration allows the pole heights to be reduced in certain areas. The H-frame configuration is also advantageous for the steep change in grade between structures 44 and 45 on the North and South lines. Ertz, Fossum, Barrett, and Askew joint pf. at 6.

28. These two lines will connect to an upgraded East Avenue substation (Component 2), providing two 115 kV feeds to the substation. LaForest pf. at 9.

29. The Williston to Tafts Corner to Essex line (the K-23 line) will be disconnected from the Essex substation and tied to the newly constructed line, which creates a looped supply from the Essex substation to the Tafts Corner substation through the East Avenue substation. *Id.*

30. Structures N-46 through N-49, and S-46 through S-49, will be steel poles with steel davit arms on concrete foundations because of the long spans across the Winooski River and the poor soil conditions at these locations. Ertz, Fossum, Barrett, and Askew joint pf. at 6.

31. Typical angle structures will be single steel poles on concrete foundations. These structures will be self-supporting dead-end structures, designed as containment structures. The conductor insulators will be attached to the pole in a vertical configuration at an 11-foot vertical spacing. *Id.*

32. Angle structures N-15, S-15, N-17, and S-17 will be steel poles with steel davit arms on concrete foundations. This configuration was used because these poles will not be designed as dead-end structures. All steel structures will have a self-weathering steel finish. *Id.*

33. The use of self-supporting steel angle structures eliminates the need to obtain additional ROW for guy anchors. *Id.* at 8.

34. The conductor will be 1272 kcmil 45/7 ACSR. Optical Fiber Ground Wire ("OPGW") cable will be used as the shield wire for both lines where only one shield wire is required. A 3/8 inch extra-high-strength steel shield wire will be used as the second shield on the H-frame structures where two shield wires are required. *Id.* at 7.

35. The standards used for the design of these new lines include the National Electrical Safety Code (NESC) 2007 Edition and the Vermont Electric Power Company Transmission Line Design Criteria Revision B. *Id.* at 9.

36. The Petitioners revised the 115 kV line design for the Project several times in order to minimize pole heights. *Id.* at 9–10.

37. The two new lines will be built within the existing ROW, so that modifications to the existing ROW are minimal for the most part. Three locations require modifications to the ROW. The first location is along the K-22 line between Structures 2 and 5. This section of the line must be moved north to provide adequate clearance for the new North route. Approximately 1.1 acres of additional ROW is required. *Id.* at 10–11.

38. The second location is an area north of the F. W. Webb Company in Williston. Approximately 0.2 acres of additional ROW is required to provide a route for the South line to tap into the K-23 line. *Id.* at 11.

39. The third location is an area where River Cove Road crosses over Muddy Brook, near the border between Williston and South Burlington. Due to a concern raised by the Vermont Agency of Natural Resources, it was necessary to move two structures away from Muddy Brook.

Three spans of each transmission line were rerouted in this area to maintain an adequate distance between the new poles and the bank of the Muddy Brook. Additional ROW is required for this reroute; however, the additional area of ROW will be offset by returning the existing unused ROW to the same landowner. The cumulative amount of new ROW is less than 2 acres. *Id.*

(2) Component 2 — East Avenue Substation

40. The East Avenue substation will be upgraded from a single-bus substation to a four-breaker ring substation, providing bus positions for the two 115 kV lines (K-23 and K-25), the existing 115/13.8 kV transformer, a new 115/13.8 kV transformer and a new 115/34.5 kV transformer. LaForest pf. at 9; Ertz, Fossum, Barrett, and Askew joint pf. at 17; exh. PET 8.3.2.

41. Presently, the substation is comprised of a 115 kV steel bus structure that interconnects the incoming radial K-25 line from Essex to the 115/13.8 kV transformer. A 13.8 kV breaker connects the transformer to the 13.8 kV enclosed switchgear via a 13.8 kV steel bus structure. *Id.*

42. The existing substation yard is approximately 80' x 200', with an adjoining 20' x 200' section owned by BED. The yard contains all of the existing equipment, plus a small relay/control house containing the protection and control devices associated with the substation's existing equipment. Ertz, Fossum, Barrett, and Askew joint pf. at 17; exh. PET 8.3.2.

43. The proposed East Avenue substation will consist of a four-circuit-breaker 115 kV ring bus switching station containing two 115 kV lines and three transformers. Two transformers will step the 115 kV down to 13.8 kV and supply a 13.8 kV switching structure. The 13.8 kV switching structure will connect the output from the two 13.8 kV transformers to the existing BED switchgear, allowing for switching between the two transformers. Ertz, Fossum, Barrett, and Askew joint pf. at 17–18.

44. With this configuration, one of the two transformers will normally supply the BED load. In the event of a failure of that unit, the second transformer will switch into service following the isolation of the failed unit. This will result in a very short outage to BED load during the switching procedures. The third transformer will step the 115 kV down to 34.5 kV. The 34.5 kV will supply a new 34.5 kV line extending to the McNeil Generating Station. *Id.*

45. The substation yard will be expanded to 110' x 376.5' to accommodate the new equipment. A new control house will be installed at the west end of the yard to contain the protection and control equipment for the new substation. A firewall will be installed between the 13.8 kV transformer and the 34.5 kV transformer at the west end of the yard to mitigate concerns about the close placement of these two transformers. *Id.* at 19.

46. A sound-reduction system will be installed to minimize sound transmission from one of the transformers to project abutters. This system will consist of a sound-attenuation wall surrounding three sides of Transformer No. 2, a 115 kV to 13.8 kV transformer located at the east end of the substation yard. The sound wall required modification to the 13.8 kV and 115 kV bus arrangements to maintain suitable clearances between the wall and the energized equipment. *Id.* at 19–20; exh. PET 8.3.3.

47. In addition to the existing fence-mounted fixtures on the west fence and the Control building, additional lighting will be installed along the east fence to provide visibility for personnel access at night. Night access is a rare event, and the lights will be manually switched on only when necessary. The new fence lighting will consist of two 70-watt metal halide outdoor floodlights. The fence lights will be directed into the substation yard, and oriented downward so as to avoid light pollution. Ertz, Fossum, Barrett, and Askew joint pf. at 20; exh. PET 8.3.3.

48. In addition, a 70-watt metal halide wall-mounted light fixture will be installed adjacent to each 13.8 kV modular substation door. The light fixture at the main control house access door (west end) will be operated by a photocell to allow safe entry into the control house at night. Ertz, Fossum, Barrett, and Askew joint pf. at 21; exh. PET 8.3.3.

(3) Component 3 — 34.5 kV line from East Avenue to McNeil

49. A new 1.5-mile 34.5 kV line will be installed between the East Avenue substation and the McNeil substation. This line will run along Riverside Avenue and Intervale Road in Burlington. LaForest pf. at 10; Ertz, Fossum, Barrett, and Askew joint pf. at 24; exhs. PET 8.1, 8.4.1 – 8.4.4.

50. The new 34.5 kV line will be constructed underground in new conduits along Centennial Road from the East Avenue substation to pole #2534 west of Colchester Avenue,

behind #220 Riverside Avenue. The line will then proceed above-ground on ten-foot wooden cross-arms above an existing 13.8 kV distribution circuit from pole #2534 to pole #4139. The line will then proceed underground along Riverside Avenue in existing conduits to pole #2950 at the intersection of Riverside Avenue and Intervale Road, at which point it will proceed above-ground on ten-foot wooden cross-arms above two existing 13.8 kV distribution circuits from pole #2590 to new pole #2614c, adjacent to existing pole #2614 directly south of the McNeil substation, and then above-ground to the north via ten-foot wooden cross-arms to the McNeil substation. Ertz, Fossum, Barrett, and Askew joint pf. at 25.

51. A section of Green Mountain Power's 3307 line just outside the McNeil substation, approximately 125 feet in length, will be placed underground to allow for the installation of the new East Avenue-to-McNeil 34.5 kV line from pole #2614c, as well as BED's distribution circuits from poles #2614a and 2614b to the McNeil substation. *Id.*

52. The new line will utilize BED's existing 13.8 kV poles where feasible, although several new poles will need to be installed, including adjacent to BED's existing pole #2614 and east of the existing Green Mountain Power 34.5 kV lines at the bottom of the hill approximately 50 feet to the south of the McNeil substation fence. LaForest pf. at 10; Ertz, Fossum, Barrett, and Askew joint pf. at 25.

53. Additionally, some of BED's existing poles will be replaced with taller poles to accommodate the 34.5 kV conductors and provide adequate clearance from the underbuilt distribution lines. Ertz, Fossum, Barrett, and Askew joint pf. at 26; exh. PET 8.4.5–8.4.6.

54. The conductor for the 34.5 kV line will be 795 MCM ACSR Drake. *Id.*

55. The portions of the 34.5 kV line not run underground will be supported on ten-foot long wooden crossarms with metal braces mounted on wood poles. Typically, the center phase will be supported via a pole-top pin mounted on the pole, with the two outer phases supported on the crossarm. The conductors themselves will rest on insulators mounted on the crossarms and pole-top pins. Ertz, Fossum, Barrett, and Askew joint pf. at 26; exh. PET 8.4.7.

(4) Removal of BED's Waterfront Facilities and Upgrade of the McNeil Substation

56. BED's Lake Street substation will be disconnected from Green Mountain Power's 3323/3328 circuit along the Burlington Waterfront, and several BED 13.8 kV lines in and around Waterfront Park will be removed and reconfigured. LaForest pf. at 10; *see* exh. VELCO-PET 8.6.1.

57. BED's Lake Street substation 34.5/13.8 kV transformer will be relocated to the existing yard at the McNeil substation and set on a new pad with oil containment. Ertz, Fossum, Barrett, and Askew joint pf. at 31.

58. The existing McNeil substation will be expanded within its fenced area to the east to include new steel structures and bus work to match the existing design of the substation. All new equipment will be set on new concrete pads. The expanded substation will tie to the existing substation via a new 35 kV bus-tie circuit breaker. The expanded substation also will include one 35 kV circuit breaker to accommodate the new East Avenue to McNeil 34.5 kV circuit and one 35 kV circuit breaker to accommodate a new 34.5/13.8 kV transformer with a load tap changer. *Id.*; exh. PET 8.5.1–8.5.5.

59. The Project modifications associated with the McNeil substation will be located within the dimensions of the existing fence around the McNeil substation, on the south side of the McNeil Generating Station. There will be an expansion of the existing substation structure, matching its open-construction design. The existing fence, which is approximately 250' x 150', will not change except for a new 20' wide gate on the east side to allow access to the new equipment within the substation. Ertz, Fossum, Barrett, and Askew joint pf. at 30–31.

60. Additional metering and relaying potential transformers will be mounted on the new steel structure, with associated fused protection, as well as a 34.5 kV station-service transformer. The 34.5 kV/13.8 kV transformer will feed, via underground cables, a new 15 kV metal enclosed modular substation. This substation will be designed for 13.8 kV operation, with one main breaker and four feeder breakers with accommodations for future expansion. *Id.* at 31.

61. All 13.8 kV and 34.5 kV circuits will enter the substation aerially from the south. The 34.5 kV circuit will require one new pole, set east of and matching the height of the existing

Green Mountain Power 34.5 kV circuit poles located south of the fence between the substation and railroad tracks. *Id.* at 32.

62. The four 13.8 kV circuits will enter the substation via two double-circuit poles (two circuits per pole, one above the other on 10-foot wooden cross-arms), matching the height of, and adjacent to, the new 34.5 kV pole, and two additional 45' double-circuit riser poles within the McNeil substation fence to allow the 13.8 kV underground cable feeds from the metal enclosed substation to transition from underground to aerial. Disconnect switches will be provided for all four circuits at the riser poles. *Id.*

63. Minimal additional lighting will be added to accommodate the expanded portion of the substation. The additional lighting level will, as much as possible, match the existing lighting level with the substation and is only being added to illuminate the additional energized substation area. *Id.* at 33.

C. Project Cost

64. The estimated total cost of the Project is \$43,484,000 for all elements (115, 34.5 and 13.8 kV) of the Project. Pet. at 6; LaForest pf. at 21; Ostrander/Kasti/Bergendahl pf. at 4–12.

65. The direct construction costs of the 115 kV lines are estimated at \$10.896 million. Ostrander/Kasti/Bergendahl pf. at 5.

66. To arrive at its final estimated cost for the 115 kV lines, VELCO sought estimates from two design firms and also had its construction superintendent prepare a bid estimate. VELCO reviewed the estimates it received for discrepancies and also to validate the numbers based on recent experience on other similar projects. VELCO then selected the bid that most closely matched its recent experience on projects and used that as its base estimate. To that base, VELCO made minor changes and other adjustments to account for, among other things, the use of different poles, sales tax, right-of-way expenses, and VELCO's recent experience. Ostrander/Kasti/Bergendahl pf. at 4–5.

67. VELCO also sought and received estimates for the East Avenue substation from two design firms before it arrived at an estimated direct construction cost of \$7.155 million. *Id.* at 7; exh. PET 7.2.

68. To come up with its estimated cost for the East Avenue substation, VELCO reviewed the estimates it received for discrepancies and also to validate the numbers based on recent experience on similar projects. After selecting an estimate, VELCO made minor changes to certain costs and then added extra costs for items such as an access road, two additional station-service transformers, contaminated-soil costs, acoustic wall, sales tax, and ROW (including demolition and replacement of a maintenance building and tree plantings.

Ostrander/Kasti/Bergendahl pf. at 7.

69. Consistent with Board Rule 5.400, VELCO has moved from using a conceptual design at the time of filing to a considerably more detailed design, which enables more accurate cost estimates. Hiatt reb. pf. at 2–3; *see* Foley reb. pf. at 1–2.

70. VELCO has reacted to the cost pressures and cost impacts to its stakeholders by implementing new methods to improve its cost-estimation process, including better change control, monitoring of escalation rates, and the use of better contingency levels. Hiatt reb. pf. at 2.

71. BED's Engineering Department has estimated that the total costs of the 34.5 kV line and the McNeil Station Upgrade will be \$3.78 million and \$4.02 million, respectively. BED developed its estimates using the Project plans. Specifically, the estimated costs of materials, labor, and equipment were developed using a combination of BED's internal material, labor, and equipment rates, vendor-supplied material costs, and VELCO's estimated costs.

Ostrander/Kasti/Bergendahl pf. at 8; exh. PET 7.2.

72. In addition to the direct construction costs, the total Project cost also incorporates certain indirect costs (including archeology and environmental costs, certain support work, and the commissioning of the substations); these costs are estimated to total \$11.816 million.

Ostrander/Kasti/Bergendahl pf. at 7; exh. PET 7.2.

73. The estimated total Project cost takes into account escalation costs, interest expenses, and a 15% contingency. Ostrander/Kasti/Bergendahl pf. at 10–12; exh. PET 7.2.

74. As designed, all of the 115 kV line elements and a portion of the East Avenue substation costs are considered pool transmission facilities ("PTF"), and as such are eligible for regional cost treatment. LaForest pf. at 21–22.

75. The allocation of the PTF costs was brought before ISO-NE's Reliability Committee; the Reliability Committee ("RC") advises ISO New England, Inc., ("ISO-NE") on allocation of regional costs for projects eligible for regional treatment. The RC voted to approve regional cost treatment for the eligible East Avenue Loop Project elements. *Id.*

76. VELCO has received approval from ISO-NE for \$25,141,670 of the Project's cost being regionally supported, or treated as PTF. Exhibit B (Petitioners' Responses to Board Staff Questions Dated February 22, 2008, at 1 and attached letter from Steve Rourke of ISO-NE dated May 23, 2007).

77. Vermont will pay only its load ratio share of the regionalized project costs. Presently, Vermont's load ratio share of regionalized costs is approximately 4.6%. That means Vermont will pay approximately \$1.27 million of the PTF cost. LaForest pf. at 22.

78. To address concerns raised by the Board and the Department regarding the accuracy of cost estimates and cost accountability, VELCO proposed a mechanism to expand upon the requirement of existing Board Rule 5.409 by setting standards for cost estimates and quarterly updates so that the estimates are more transparent, scope changes tie back to the cause for the change (e.g., changes required by permits or landowner requests), and construction progress is measured regularly and in the context of costs. VELCO has proposed to follow the process outlined in the request for rulemaking for all of its transmission projects currently under review by the Public Service Board. Exhibit B at 9.

D. Project Schedule

79. The estimated construction schedule was from the fourth quarter of 2008 to the third quarter of 2010. Pet. at 6; LaForest pf. at 22.

80. Failure to achieve this schedule will likely have adverse impacts on local reliability and overall Project cost. LaForest pf. at 23.

E. Design Parameters

81. Throughout the course of the Project design process, and particularly once the Petitioners engaged and received public input during an extensive public outreach process, the Petitioners identified several design parameters, discussed below, that reduced the Project's impacts without unduly compromising design and performance criteria. LaForest pf. at 18.

82. Use of the existing ROW: The selected transmission alternative for the EAL consists of developing two new 115 kV lines in 4.8 miles of existing ROW and removing one line. The initial conceptual design required significant additional ROW due to required support structures for the poles (i.e., anchors and guy wires). To avoid this, the Petitioners decided to use a variety of self-supporting pole structures to provide the necessary support for tensioning and side loading. This resulted in the design being changed from all wooden poles to a combination of direct buried wooden and steel poles, with the steel poles having concrete foundations. Following this design change, three locations along the Essex to East Avenue ROW still needed additional or revised ROW due to design requirements and to address environmental concerns unrelated to support structures. The total additional required or affected ROW minimally affects approximately 3 acres. LaForest pf. at 18–19.

83. Maximizing design using existing ROW width: Clearances necessary for standard construction practices often utilize off-centered pole locations in rights-of-way. Use of this practice in the Essex to East Avenue corridor would have resulted in an increased number of danger trees that would need to be removed because the distance to the edge of the ROW was significantly less than 50 feet. The Petitioners opted to propose locating the new poles as close to the center of the ROW as possible while keeping the old line in service. The Petitioners have chosen construction methods to allow the poles to be moved closer to the center of the ROW. The Petitioners also reached an agreement to construct the new lines with a construction clearance as close as 12 feet to the energized line. In addition, in many locations, one phase of the energized line will be temporarily moved into and attached to the pole to maintain the 12 feet of separation during construction. LaForest pf. at 19.

84. Changes to structure heights: The initial EAL conceptual designs generally resulted in an increase of 18 to 27 feet in above-ground pole height over existing poles, with one pole

potentially being 43 feet higher. The reasons for the pole-height increases included the transition from H-frame construction to vertical (i.e., single-pole) construction, minimum line clearances needed for maintenance activities, line shield angle changes to minimize the likelihood of direct lightning strikes to the new lines, and conformance with current industry design and safety standards. The Petitioners considered the aesthetic impacts associated with the new design standards by evaluating reducing the minimum clearance to the ground, increasing the tension on the conductors, changing the conductors to a lighter material, and reducing the distance between the conductors. After weighing these options, the Petitioners again changed the design by reducing the 3-foot minimum conductor clearance to ground, and decreasing the clearance between the conductors from 15 to 12 feet. The Petitioners addressed the potential "galloping" concerns introduced by the reduction of conductor clearance from 15 to 12 feet by adjusting the location of a few poles. The tallest poles were addressed on a case-by-case basis. The current design results generally in an increase of 9 to 25 feet in above-ground height over the existing poles, with one proposed pole being 38 feet higher. LaForest pf. at 20–21.

85. East Avenue substation redesign: The original substation layout did not allow access for a transformer replacement in case of a failure, due to the land contour. In order to accommodate a potential transformer change, the Petitioners developed a design that changes the control house to the opposite end of the substation and elevates the control house four feet while maintaining the elevation of the transformers. This change minimized the aesthetic impacts associated with the redesign. LaForest pf. at 21.

F. Public Outreach

86. Beginning in August 2006, the Petitioners utilized a multi-faceted approach to engage the public in different forums to discuss Project need, potential alternatives, and to address public questions, concerns, and recommendations to improve the design. This involved engaging key stakeholders and the general public through public and private meetings, municipal boards and commissions, mailings, television coverage, website postings, and direct questions asked of the Petitioners. Mallory pf. at 3.

87. Participants in the stakeholder process included directly-affected landowners, business community representatives, regulatory agency representatives, utility regulatory representatives, major community institutions (including the University of Vermont), political representatives, and representatives of environmental and conservation groups who may have an interest in the Project. Municipal representatives were also invited to the key stakeholder meetings. The Petitioners hosted three stakeholder meetings. Mallory pf. at 3–4; exh. PET 12.5.

88. The Petitioners also held three open-house meetings with members of the general public. To accommodate a landowner who could not attend the open-house meetings, Chittenden Community Television's Channel 17 was invited. Channel 17 filmed the open-house meeting in its entirety. This film has been airing on local community television, and is posted to VELCO's EAL website. Mallory pf. at 4.

89. For the open-house meetings, the Petitioners developed a more extensive list with roughly 900 contacts, including the key stakeholders, media contacts, and businesses and landowners with properties directly within and located close to the transmission corridors. Notices for the open-house meetings, and general information regarding the status of the Project, were distributed to those on the larger list. Petitioners also advertised all three open-house meetings in the Burlington Free Press and Seven Days, and broadly distributed press releases announcing the open-house meetings and the distribution of the pre-filing package. Mallory pf. at 5; exhs. PET 12.3–12.7.

90. The public outreach process has been helpful in identifying parameters that have reduced the Project's impact without unduly compromising the design and performance criteria. For example, the Vermont Agency of Natural Resources expressed a concern that existing 115 kV poles were located too close to the Allen and Muddy Brooks in Williston and South Burlington. The Petitioners adjusted the Project design by moving the proposed poles farther away from the stream bank, resulting in the need to change the ROW. The affected landowner was contacted, accepted the reroute, and is willing to change the ROW. Overall, the outreach process led to a more comprehensive and detailed Project design for submission to the Public Service Board. Mallory pf. at 6–8.

G. Section 248(b) Findings**(1) Orderly Development of the Region**

[30 V.S.A. § 248(b)(1)]

91. The Project will not unduly interfere with the orderly development of the region, with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality. This finding is supported by findings 92 through 137, below.

92. The affected municipalities include the Town of Williston, the City of South Burlington, the Town of Colchester, the City of Winooski, and the City of Burlington. Each of the foregoing towns and cities are members of the Chittenden County Regional Planning Commission; several also appoint representatives to the Winooski Valley Park District. Mallory pf. at 8–9.

(a) Town of Williston

93. The proposed upgrades in Williston include one segment of the new 115 kV line (from poles 3 through 17 of the K-25 line, including a reroute by Allen Brook), movement of the K-22 line north of the Town of Williston garage, and connection between the K-23 and K-25 lines. Mallory pf. at 9; exh. PET 8.1.1, Sheets 1–2.

94. The 2006 Town of Williston Comprehensive Plan states that Williston anticipates future siting of utility lines and facilities within the Town, and seeks to ensure that new regional transmission lines, substations, and similar support facilities are located within existing corridors, and that impacts on natural, scenic, and historic resources are minimized. The Plan recommends that power lines "be placed underground where feasible." Mallory pf. at 9–10; exh. PET 12.8.

95. In Appendix F, at pages F-2 and F-3, the Plan anticipates upgrades to the VELCO transmission system located within the town, but recommends that utility lines, pole placements, and substation siting should minimize disturbance to wetlands, streams, wildlife habitat, views, and other natural and historic resources, and that clearing of vegetation should be minimized regarding such transmission construction. Mallory pf. at 10; exh. PET 12.8.

96. The Petitioners have designed the Project to optimize the use of, and to confine to the greatest extent possible, the proposed replacement utility infrastructure to the existing utility corridor in Williston. Aesthetic, natural, and archeological resources have been addressed, as discussed more fully in subsequent findings. Mallory pf. at 10.

97. The Petitioners have not proposed undergrounding of the 115 kV portion of the Project for several reasons, including the potential for significant cost increases, the ineligibility of underground lines for cost-sharing with other New England states at the present time, the longer repair time required when there is an outage, and potentially greater impacts on environmental and archaeological resources in the existing corridor. Mallory pf. at 27.

98. There are three proposed changes to the VELCO ROW in Williston for the Project. One covers approximately 1.09 acres of additional ROW north of pole 4 of the K-25 line to allow for the K-22 line to be moved further north and make room for the additional K-25 line in the same corridor; this property is owned by Green Mountain Power and the Town of Williston. The second is approximately 0.14 acres of additional ROW south of pole 3 of the K-25 line to allow it to be connected to the K-23 line in the same corridor. The last is a proposed shifting of the existing ROW between poles 14 to 17 of the K-25 line to allow for the poles to be moved further away from the banks of the Allen and Muddy Brooks. Mallory pf. at 11; exh. PET 8.2.2.

99. The only other activity in Williston involving the Project is the Williston Lay-down Area, located between Hurricane Lane and Old Creamery Road on the portion of Route 2A (also known as St. George Road) that extends between Williston and St. George. It is generally accessed by heading south from Exit 12 of Interstate 89, past Hurricane Lane following a long hedgerow, and turning left at a yellow metal gate. The area where construction staging will take place is essentially in a field part of the way up toward the Oak Hill water tower. Ostrander supp. reb. pf. at 3; exh. PET REB.7.1.

100. The Williston Lay-down Area will be used as a staging area for delivery and distribution of Project materials. The materials include, but are not limited to, wooden and steel poles, conductor, insulators, bracing, and miscellaneous hardware. It will also be used as a contractor assembly area which includes an office trailer and parking of construction equipment and employee vehicles. Ostrander supp. reb. pf. at 3.

101. The Williston Lay-down Area is an appropriate location for temporary storage of poles and construction material, as it is in close proximity (via Vermont Route 2A and I-89) to the 115 kV and 34.5 kV line corridors, as well as the two substations. The site also provides approximately 4 acres of relatively flat terrain, requires minimal tree clearing, contains an existing access road, and does not directly impact residential areas, rare, threatened and endangered species ("RTE species"), or archeologically sensitive sites. *Id.* at 3–4.

102. Based on the current construction schedule, and anticipating that a certificate of public good would be issued in the summer of 2008, VELCO plans to use the Williston Lay-down Area from the third quarter of 2008 until the third quarter of 2009. VELCO proposes to restore the area to its original condition when construction is complete. All construction-related supplies, equipment, and debris will be removed from the site upon completion of the Project. If additional Project "lay-down" yards are necessary to support construction, they will be assessed for applicable Section 248 and regulatory permitting criteria, and necessary requests for authorization will be submitted to the PSB and state and federal agencies. *Id.* at 4.

103. On November 19, 2007, the Williston Selectboard adopted its Interim Unified Development Bylaw ("Bylaw") to supersede several provisions in the old ordinance. Pursuant to the Bylaw, the Williston Lay-down Area is now located in what is called the Agricultural/Rural Residential Zoning District ("ARZD"). The Bylaw does not specifically allow construction staging areas or contractor's yards in the ARZD, although Section 31.11 provides standards for nonresidential/nonagricultural uses in the ARZD, including "outdoor storage areas." *Id.* at 5–6.

104. Given that there is only a storage building on the Property, and because outdoor storage is only permitted "within side and rear yards that are designated for that purpose on an approved site plan," the Williston Lay-down Area would not technically comply as an "outdoor storage area." (Bylaw § 31.11.3). However, the Bylaw goes on to state that outdoor storage areas must be "buffered from public ways and adjoining properties," and provides that "temporary outdoor storage of construction equipment and materials outside designated areas is permitted" between when construction commences (pursuant to a building permit) and the date of final inspection of the Town. (Bylaw §§ 31.11.3.1 and 31.11.3.3.) *Id.* at 6.

105. In light of the absence of aesthetic impacts, the temporary usage of the area, and the absence of any evidence of opposition by the Town or adjacent property owners, use of the property for construction staging will be consistent with the Bylaw's policy preferences. *Id.* at 6–7.

(b) City of South Burlington

106. The proposed upgrades in South Burlington include three segments of the new 115 kV line, corresponding to poles 18 through 40, 42, and 51 through 54 of the K-25 line. Mallory pf. at 11; exh. PET 8.1.1, Sheets 3–5, 6.

107. With regard to the siting of electric transmission facilities, the 2001 South Burlington Comprehensive Plan ("SBCP") contains the following goal: "to provide quality public and quasi-public utilities and services to all residents and businesses in a manner that is efficient, cost-effective and environmentally sound." The SBCP encourages transmission infrastructure and future utility lines to be undergrounded, but also notes that "[f]uture transmission lines should be confined to existing utility corridors and placed underground if possible." Mallory pf. at 12; exh. PET 12.9.

108. South Burlington actively participated in the docket, and presented direct testimony in the case. Neither of the City's witnesses claims that the Project is inconsistent with the SBCP; however, both witnesses expressed special concerns regarding Muddy Brook Park. Eiseman pf. at 1–2; Hinds pf. at 4.

109. Concerns at a February 13, 2007, meeting among South Burlington representatives and Petitioners focused on coordination as the Project moves forward in design and construction. Specifically, coordination was requested when noticing and working with Ethan Allen Industrial Park landowners or tenants, and with respect to the WVPD and the City arborist. Mallory pf. at 13.

110. Through ongoing discussions between South Burlington, WVPD, and Petitioners, these parties entered into a Memorandum of Understanding to address aesthetic, natural resource, and vegetation management issues. Findings concerning the Park and other lands of the

Winooski Valley Park District are discussed in connection with Criterion 9(K), as well as in the section on the WVPD Master Plan, below. Exh. PET 12.18.

111. The Petitioners have designed the Project to optimize the use of the existing utility corridor in South Burlington and to keep to an acceptable level the impacts and effects associated with the redesigned utility infrastructure. The City is not proposing a redesign of any utility lines. Agreed-upon landscaping plans in more sensitive areas of the City will prevent aesthetic impacts from being unduly adverse. Mallory pf. at 13; tr. 3/6/08 at 30–31, 52–53 (McLean).

112. The need for this Project is consistent with South Burlington's goals to allow for the City's continued growth as an urban center and to provide quality utilities and services to all residences and businesses. Mallory pf. at 13.

(c) Town of Colchester

113. The proposed upgrades in Colchester are limited to a short segment of the new 115 kV line and Structures N/S 41, located at the Twin Bridges site. The St. Michaels Alt. # 2 access route is also located in Colchester. Mallory pf. at 14; exh. PET 8.1.1, Sheet 5a; exh. PET REB 8.1, Attachment Sheet 14A–14B.

114. The Colchester Master Plan ("CMP") specifically identifies areas in the Town to serve specific land use goals and strategies, including preserving lands needed for public infrastructure. The Project, because of its location near the Lime Kiln Gorge area, does not affect any of those specific areas. Additionally, the Town desires that the pace of utility infrastructure keep pace with that of more general development. Mallory pf. at 15; exh. PET 12.10.

115. The CMP also states that "wherever possible, new or relocated electric cables, communication cables, switches and similar equipment should be located underground." The CMP proposes that where energy companies seek to build transmission facilities through Colchester that are not designed to bring energy to the Town, the Planning Commission intends to determine and seek payments (or a set-aside of a portion of the energy traveling over the facilities) to compensate for aesthetic impacts, safety impacts, disruption during construction, and loss of use costs incurred by the project. Furthermore, the CMP states that energy companies and other utilities that have Certificates of Public Good should work with the Town to ensure

that the good of Colchester's community is also being served. Mallory pf. at 15–16; exh. PET 12.10.

116. Lastly, and although not directed at transmission-facility siting, but relevant to transmission siting in relation to earth disturbance for project construction, the CMP suggests the use of predictive modeling of archaeological sites as a tool to locate potentially important sites and assist developers in recognizing archaeological resources before final site plans are developed. Mallory pf. at 16; exh. PET 12.10.

117. The Petitioners have given due consideration to provisions of the CMP. Specifically with respect to archeological resources, the Twin Bridges area has been included in the Scope of Work prepared by Petitioners' archeologist. Exh. PET 15.2.2.

118. The natural resources impacts at the Twin Bridges Site is discussed in this proposed decision in the section addressing rare and irreplaceable natural areas. *See* findings 376–390, below.

(d) City of Winooski

119. The proposed upgrades in Winooski include one segment of the new 115 kV lines stretching from near the existing substation off of Gorge Road across I-89, and through the Winooski Wetland until the river crossing into the City of Burlington. Structures 43 to 48 will be constructed in Winooski. Mallory pf. at 17; exh. PET 8.1.1.

120. The City of Winooski 2003 Municipal Development Plan ("WMDP") does not directly address transmission siting. However, the WMDP lists as a general goal the provision of adequate and efficient public facilities and services. Mallory pf. at 17–18; exh. PET 12.11.

121. Since the EAL is being proposed to provide adequate and efficient electric service to the Chittenden County area, the Project is consistent with the WMDP. Mallory pf. at 18.

(e) City of Burlington

122. The portions of the Project that will take place within the City of Burlington are substantial and include the following components: (i) installation of Structures 49 to 50 and 55 to 58 of the K-25 line; (ii) replacement of the East Avenue substation; (iii) installation of the

34.5 kV line from East Avenue substation to McNeil substation; and (iv) removal of BED's Waterfront Facilities and upgrade of the McNeil substation. Mallory pf. at 18–19.

123. The 2006 City of Burlington Municipal Development Plan ("CBMDP") states that "although it is prohibitively expensive to accomplish in all areas, there are parts of the City where placing overhead utilities underground, or relocating them behind buildings, must be an important design consideration." The CBMDP goes on to state, "[P]riority should be given to undergrounding overhead utilities in the Downtown Waterfront, the North Street Commercial District, Riverside Avenue, North Winooski Avenue, streets that offer important view corridors to Lake Champlain, and the main approaches into the city." Mallory pf. at 19–20; exh. PET 12.12.

124. In terms of archeological impacts of construction, the CBMDP states that the City intends to preserve archeological resources. Relevant to reliability of infrastructure, the City states that investment in the necessary infrastructure to support future development "must occur first in order to attract business growth and opportunities." The CBMDP makes specific reference to the need for better energy systems to support the City's goal of economic development. Mallory pf. at 20; exh. PET 12.12.

125. The CBMDP Energy Plan, Section VIII, recognizes the City of Burlington as a leader in energy efficiency, but has no specific statements relevant to the issue of transmission siting. *Id.*

126. Following briefing by BED before the Transportation, Energy, and Utilities Subcommittee of the Burlington City Council in 2006 and early 2007, the Subcommittee recommended that a resolution of support for the Project be developed for consideration by the full City Council. This resolution was considered and passed by the Subcommittee on January 16, 2007. BED then presented the resolution to the Finance Board of the City Council on January 29, 2007, where it was adopted and forwarded to the full City Council. BED subsequently presented this resolution to the full City Council for consideration on March 12, 2007, at which meeting the City Council adopted the resolution. Mallory pf. at 20–21; exh. PET 12.13.

127. The EAL objectives are consistent with improving reliability of electricity services for Burlington. As noted below (see finding 143), the Project was selected over other transmission alternatives based on the City's desire to place utilities underground at the Burlington Waterfront and along Riverside Avenue. The EAL utilizes existing underground duct banks in Riverside Avenue for underground placement of the 34.5 kV line in that area. The EAL will also result in the removal of BED lines and equipment presently visible from Waterfront Park. Completion of the EAL will eventually enable Petitioner Green Mountain Power to plan subsequent transmission improvements that, if realized, should allow for the removal of Green Mountain Power's overhead lines at the Waterfront. Mallory pf. at 22.

128. The 34.5 kV line from the East Avenue substation to the McNeil substation, which will be jointly owned by BED (66 2/3%) and GMP (33 1/3%), will be built underground except for two sections: (1) adjacent to Salmon Run Apartments; and (2) from the intersection of Riverside Avenue and Intervale Road to the McNeil substation. The 34.5 kV line does not continue underground in the vicinity of Salmon Run Apartments due to the high cost of placing this circuit underground and the fact that the number of above-ground circuits near Salmon Run Apartments will not increase. Exh. PET B (Response to PSB Staff Memo of 2/22/08) at 2.

129. Presently, BED has two aerial distribution circuits within its easement adjacent to Salmon Run. Project plans call for BED to remove the top distribution circuit (EAL2 circuit) and install the proposed 34.5 kV circuit in its place. By eliminating BED's EAL2 circuit, the number of above-ground circuits in this area will not change. As for the cost of undergrounding, the incremental cost to place BED's 34.5 kV circuit underground at Salmon Run is projected to be approximately \$418,200. This estimate assumes BED's existing distribution line will stay aerial at this location. *Id.*

(f) Chittenden County Regional Planning Commission

130. The Chittenden County Regional Planning Commission ("CCRPC") adopted the Chittenden County Regional Plan ("CCRP") on August 28, 2006. The CCRP states as a policy objective that energy production, transmission, and distribution infrastructure in Chittenden

County should be efficient, reliable, cost-effective, and environmentally responsible. Mallory pf. at 22–23; exh. PET 12.14.

131. The CCRP calls for a larger share of the county's energy needs to be supplied by a combination of responsible new generation in the county, maintenance of renewable power sources (such as hydroelectric power), improved transmission, and gains made through increased efficiency and conservation. Mallory pf. at 23; exh. PET 12.14.

132. In terms of stimulating economic development, the CCRP states generally that the "State and municipalities should support infrastructure investment to foster economic development in areas planned for development." To this goal, transmission expansion and upgrades would provide infrastructure relevant to economic development. Mallory pf. at 23; exh. PET 12.14.

133. The Infrastructure section of the CCRP states as a general principle that:

[I]nfrastructure systems may be made more dependable, safe, and/or cost-efficient by increasing the size or efficiency of the system. Infrastructure systems that serve as networks (e.g., telecommunications or transportation) are more valuable when the network is expanded to serve more people or a larger territory. To achieve these economies of scale or performance improvements, some infrastructure systems are expanded so that they cross municipal boundaries. These expansions may be accomplished in different ways: A for-profit or a nonprofit private enterprise may be authorized as a utility to provide these services — or one key part of the infrastructure system — in a prescribed area (e.g., VELCO, Vermont Gas Systems, and telecommunications providers).

Exh. PET 12.14.

134. In terms of archeological impacts associated with construction projects, the CCRP recognizes that "some historic resources are recognized and well interpreted, while others are less visible or even kept secret for their protection (particularly archeological resources such as burial sites). Resources can be significant to local, Vermont, or the national history." The CCRP goes on to reference the Vermont Historic Preservation Act for the protection of archeological resources, to which transmission siting projects are subject within the State. Mallory pf. at 24; exh. PET 12.14.

135. Consistent with the CCRP, the Project is designed to improve the electric transmission system, making the electric infrastructure system more dependable. The Project is

planned almost entirely within an existing transmission corridor, thereby minimizing the aesthetic effects of the upgraded facilities. Mallory pf. at 25. Impacts on natural, archeological, and aesthetic resources are discussed elsewhere in this decision. *See* findings in Sections G (5)–(8), and H through K, below.

(g) Winooski Valley Park District

136. The Master Plan of the WVPD, dated May 2004 ("Master Plan"), is intended, among other things, to address conservation of natural areas within the Park District. The Park District staff and trustees review plans and permit applications of public and private projects and operations, including utility rights-of-way, which may directly affect assets, programs, and the mission of the Park District. These proposals are reviewed to ensure that they are consistent with the mission of the Park District. The review is intended to ensure that all the potential costs and benefits are taken into consideration before making a final decision. Mallory pf. at 25–26; exh. PET 12.15.

137. The Petitioners have entered into a Memorandum of Understanding with the WVPD to address impacts in park lands. The MOU includes specific landscaping plans designed to reduce aesthetic impacts, as well as construction-related conditions to reduce impacts on natural resources. Exh. PET 12.18. These are discussed in findings 296–375 (aesthetics) and 432–441 (public investments) in this decision.

Discussion

Under Section 248(b)(1)'s statutory language, the proposed Project does not need to conform to the requirements of the local and regional plans for the affected communities, only that this Board give due consideration to the land conservation measures in such plans and the recommendations of the affected local and regional planning commissions and legislative bodies. Having given due consideration to those measures and recommendations, for the reasons set forth in the above findings, I conclude that the proposed Project will not unduly interfere with the orderly development of the region.

(2) Need for Present and Future Demand for Services

[30 V.S.A. § 248(b)(2)]

138. The Project is required to meet the present and future demand for services that could not otherwise be provided in a more cost-effective manner through energy conservation programs and measures and energy efficiency and load management measures. This finding is supported by findings 139 through 185, below.

139. The present electric sub-transmission and distribution network in the EAL Chittenden County area cannot provide adequate and reliable electric service to the customers served in that area. *See* findings 1 through 23, above.

140. The Petitioners evaluated numerous transmission and non-transmission alternatives to the Project. The analyses included: (1) the Chittenden West Planning Study Report, which evaluated transmission options over a 20-year period, evaluated in detail as part of the Burlington Waterfront area specific collaborative ("ASC"), under the direction of BED and Green Mountain Power with involvement by VELCO and the Department of Public Service ("Department" or "DPS") (*see* exhs. VELCO-PET 1.4–1.5); (2) an evaluation of energy efficiency carried out by BED and Green Mountain Power; (3) an evaluation of generation alternatives carried out by BED (*see* exh. VELCO-PET 5.5); (4) an evaluation of the impact of the proposed East Avenue Project in the VELCO 2006 Long Range Plan study (*see* exh. VELCO-PET 1.3); and (5) NEPOOL Steady State analysis (*see* exh. VELCO-PET 4.3).

(a) Transmission Alternatives

141. During 2004 and 2005, BED, Green Mountain Power, and the DPS analyzed more than twenty 34.5 kV and 115 kV alternatives. For each alternative, numerous contingencies were simulated, resulting in over one thousand load-flow runs. Litkovitz pf. at 5; LaForest pf. at 15.

142. During this process, a "one-company" philosophy was followed, by which a least-cost solution for all issues was sought, regardless of the extent to which upgrades appeared on the VELCO system, the BED system, or the Green Mountain Power system. Litkovitz pf. at 6.

143. Among the alternatives, the East Avenue Loop Project is the only solution that offers the following advantages: first, it has the greatest avoided-line-loss benefit. Second, significant components are eligible for regional funding, resulting in the lowest cost to Vermont ratepayers. Third, it allows for removal of the Burlington Waterfront lines (which would occur as part of the second phase, in 2010). Fourth, this solution is the most robust among the alternatives, and hence has the greatest longevity. Fifth, this solution provides a system that was best able to support new, although as yet unplanned, generation. Litkovitz pf. at 6.

(b) Energy Efficiency

144. Savings from energy efficiency will not defer or eliminate the need for the transmission upgrades that are proposed as part of the Project, for several reasons. First, reducing demand does not solve the system-configuration problems that place much of BED's load at risk. Second, the amount of demand reduction needed in either BED's or Green Mountain Power's service areas is simply too great for energy efficiency resources to provide any meaningful solution. Grimason pf. at 4; Becker pf. at 2; Poor pf. at 2–3.

145. BED's most recent summer peak load was 71.12 MW in 2007, which is very close to the 71.6 MW forecasted by BED. Based upon the BED forecast, the summer peak load for 2009 is expected to reach 73.5 MW. The load forecast is net of what BED expects to achieve with its current energy efficiency programs. Loads would need to be reduced by 14.4 MW by 2009 to achieve the 59 MW load level to allow BED to feed all of the load served by the East Avenue substation from its other two substations. However, the maximum cost-effective additional energy efficiency beyond what BED is estimated to achieve by 2009 is only 1.4 MW. In other words, the amount of additional load reduction needed to reach 59 MW by 2009 is ten times the maximum amount that could be achieved. Grimason pf. at 5; Becker pf. at 2–3.

146. BED has undertaken extensive demand-side management efforts for much of the past two decades. These efforts have had dramatic impacts on BED's energy and peak-load levels that in turn helped keep summer peak loads stable. At the end of 2006, BED's energy load was 0.4% lower than its load in 1989. Much of that stability in overall energy load can be

attributed to energy efficiency efforts. Further, BED's overall system peak was only 6 MW higher in 2006 than in 1989, a 9.4% total increase in 17 years. Nolan pf. at 3–4.

147. While BED's energy-efficiency efforts over the years have served to lessen the instances when BED's load exceeds 59 MW, which is presently the level above which approximately 17% of its customers are exposed to loss of service for an extended period of time, no level of additional energy efficiency efforts can eliminate or defer the need for the Project. Nolan pf. at 3.

148. Petitioners also analyzed the energy efficiency potential for the Chittenden County area load served by Green Mountain Power. The results of the analysis showed that by 2009, the year the Project is scheduled to be in service, cost effective energy efficiency could only reduce loads by 7.2 MW, to 146.8 MW. In order to address Green Mountain Power's needs, loads would need to be reduced to approximately 120 MW. This would require a 34 MW load reduction by 2009 (from 154 MW to 120 MW). In other words, the amount of additional load reduction that would need to be achieved by 2009 would need to be over 4 times what could be achieved. Grimson pf. at 5–6.

149. Under the Distributed Utility Planning ("DUP") guidelines, energy efficiency and other DUP resources are not applicable where the transmission system problem cannot be avoided or deferred by reductions in load. Grimson pf. at 4 (citing the September 22, 2000, Guidelines for Distributed Utility Planning § 1 (b) (included as Attachment A to the Docket No. 6290 MOU, and as Attachment C to the Docket No. 7081 MOU)).

150. The City of Burlington is fed from a single radial 115 kV source at the East Avenue substation, and approximately 40% to 50% of the City of Burlington's load is subject to instantaneous loss of load due to several different single-contingency exposures. Even if load were reduced through energy efficiency, it would not solve the reliability exposure to the remaining customer load that would experience outages under the single-contingency scenarios described by the transmission planners. Grimson pf. at 4–5.

(c) Generation

151. Petitioners also examined the potential for a generation alternative to defer or remove the need for the 115 kV loop portion of the Project. The analysis considered the costs to construct generation capacity in the limited local locations that would minimize the number and size of generators needed as an alternative. In addition, the analysis included the costs of sub-transmission facilities needed to interconnect new generation for delivery to the electric grid, as well as estimated potential capacity payments from the Forward Capacity Market ("FCM") currently being implemented by ISO-NE. Nolan pf. at 7–10; exhs. PET 5.4 & 5.5

152. There are limited feasible generation alternatives, and they are more costly than the proposed Project. Four separate analyses completed over 7 years have repeatedly confirmed that the East Avenue Loop Phase I Project is a lower-cost alternative to address the area reliability concerns than the potential generation alternatives. *Id.*

153. The \$54 million expected net present value of the generator costs (capital and operating) was more than double the \$22 million cost of the avoided transmission components. Lamont pf. at 3; Nolan pf. at 9–10.

154. This determination is even more pronounced in relation to Vermont ratepayer costs, since the transmission alternative qualifies for PTF treatment, while the generator alternative does not. Nolan pf. at 3.

155. Moreover, as the Board identified in connection with the Lamoille County Project, distributed generation raises additional concerns when utilized to solve a transmission deficiency, including: (1) the reliability of a single generator is less than that of a transmission line; (2) the availability of a generator is less than that of a transmission line because scheduled and unscheduled maintenance is more frequent for a generator than a transmission line; and (3) generation needs to be able to stay on line during faults. *In re: Lamoille County Reliability Project*, Docket No. 7032, Order of 3/16/06 at finding 66; LaForest pf. at 17–18.

(d) Demand Response

156. Demand Response could not defer the East Avenue Loop Project. With nearly 10 MW signed up for the ISO-NE program in the BED service area, BED had approximately

15% of its peak load enrolled in the program at the time of its system peak in July 2002. Yet when BED was called upon by the program to drop the peak load on its peak day in July 2002, only 950 kW were actually curtailed. Nolan pf. at 6.

157. Often customers who had agreed to participate simply did not respond when asked. Other times customers would react for an hour or two, then would turn loads back on even though reductions were still needed by BED. On a few rare occasions, customers actually curtailed load, and then turned it back on at exactly the wrong time, causing BED to have loads higher than would have occurred without the Demand Response program. *Id.*

158. Given the need for 48.4 MW of peak load reduction by 2009, energy efficiency, demand response, and other load management resources are not a viable option to the proposed EAL transmission project. Becker pf. at 5.

159. Demand Response programs are not instantaneous and thus cannot be called upon in emergencies. Demand Response programs, while helpful to the system, cannot provide for contingencies in the same manner as transmission or generation. *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at finding 106.

160. Demand Response can assist in meeting an area's peak demand on a short-term basis, but reliance upon Demand Response for an extended duration is likely to lead to a poor response rate. *Id.* at finding 107.

161. While Demand Response programs can have important benefits in reducing power supply costs and reducing emissions from running peaking generation, they cannot be counted upon to provide system reliability. Nolan pf. at 5–6.

Discussion

When considering 30 V.S.A. § 219, the Board has observed that it

has an obligation to ensure that Vermont's electricity customers receive "adequate service." While the legislature did not define "adequate," . . . it is clear that adequacy of electric service is a relative and dynamic standard, such that a level of service that may have been "adequate" in years past might no longer meet that standard today, given the pervasiveness of modern technology in the home and workplace for which electricity is essential.

In re: Northwest Vt. Reliability Project, Docket No. 6860, Order of 1/28/05 at 9 (footnote omitted). As this Board concluded in its Order approving the Northwest Vermont Reliability Project:

Operating and maintaining a reliable electric transmission infrastructure and power supply delivery system is vital to Vermont's economy and a 21st century society:

Modern society has come to depend on reliable electricity as an essential resource for national security; health and welfare; communications; finance; transportation; food and water supply; heating, cooling and lighting; computers and electronics; commercial enterprise; and even entertainment and leisure — in short, nearly all aspects of modern life

Id. at 18 (citing U.S.-Canada Power System Outage Task Force, Final Report on the August 14, 2003, Blackout in the United States and Canada: Causes and Recommendation 5 (Apr. 2004).

The evidence in this case clearly demonstrates that the level of risk inherent in the existing system is unacceptable and jeopardizes the economy, public health, and vital infrastructure. The need for the Project is primarily driven by the present transmission system configuration at the East Avenue substation, i.e., a single, radial, 115 kV feed. Therefore, no level of demand-side investments can provide the redundancy needed to avoid the loss of load BED experiences when either the East Avenue substation or the 115 kV line serving it are out of service.

I conclude, based upon the evidence presented, that this Project is required to meet a need for present and future demand for service that could not otherwise be provided in a more cost effective manner through energy conservation programs and measures and energy efficiency and load management measures.

(3) System Stability and Reliability

[30 V.S.A. § 248(b)(3)]

162. The Project will not adversely affect system stability and reliability; in fact, the Project will enhance system stability and reliability. This finding is supported by findings 139 through 161, above and findings 163 and 164, below.

163. The Project will reduce or eliminate most local sub-transmission overloads and will not have an adverse impact on the set of upgrades found necessary for transmission reliability needs over the examined 10-year time period. LaForest pf. at 14.

164. Studies that have been performed by VELCO, as well as ISO-NE's review, have concluded that the proposed Project will not have a significant adverse effect on the stability, reliability, or operating characteristics of the VELCO transmission facilities, the transmission facilities of another transmission owner, or the system of a market participant. Litkovitz pf. at 7; exh. PET 4.2.

(4) Economic Benefit to the State

[30 V.S.A. § 248(b)(4)]

165. The Project will result in economic and social benefits to the state of Vermont and its residents. This finding is supported by findings 166 through 185, below.

166. The Project will improve the reliability of the electric transmission system serving all of Chittenden County, including the City of Burlington, by removing critical loads from single-contingency exposure. *See* Litkovitz pf. at 3–4.

167. As noted in findings 1–23 above, the Chittenden County load area at risk includes the entire City of Burlington, as well as all electric customers in the communities of South Burlington, Williston, Colchester, Winooski, Essex, Richmond, and Bolton. LaForest pf. at 11–12.

168. The City of Burlington is the largest city in the State of Vermont and serves many critical loads, including health-care, high-tech industry, and essential municipal services. An example is the Fletcher Allen Health Care Hospital, Vermont's only Level I Trauma Center. The nature of the daily operation of a major health-care facility, from critical life-support equipment and procedures, clinical analysis, physical plant requirements to their administrative support and more, justifies the need for the most reliable power available. Kasti pf. at 6.

169. The Given Medical Research facility on the University of Vermont campus requires reliable electric service for a different reason. This building houses critical research and experimentation in a number of diverse medical fields, including cancer research. Some of these

experiments have been in place for years and are still ongoing. Years of valuable time and information critical to the success of these studies are in jeopardy if the power source is not maintained. *Id.* at 7.

170. Water and wastewater processing facilities, though not as high profile as hospitals and university research laboratories, play a major role in the operation of any community. Fire suppression, wastewater processing, and clean drinking water support the critical needs of any community. *Id.*

171. Other municipal functions are equally critical to the secure and orderly operation of a city. Traffic signals require higher level of reliability on high-traffic streets, and law enforcement officials rely on electric power to maintain communication and security systems. *Id.*

172. BED also serves such high-density loads as the University of Vermont and Trinity and Champlain Colleges. These teaching institutions are highly computerized, not only for class instruction but also for facility controls campus-wide. *Id.* at 7–8.

173. The City of Burlington's downtown commercial core includes many critical government and business functions. Some of these businesses are process driven, which means even minimal down time could cause thousands of dollars in lost production. *Id.* at 8.

174. The dynamic businesses of banking and investment brokering rely on highly computerized equipment to operate in a real-time industry. Reliability of their electrical service is imperative to the success of these service-orientated businesses. The ramifications of a questionable power supply to these businesses and their customers could prove catastrophic to all concerned. *Id.*

175. The success of these businesses is vital to the economy of the City of Burlington and, in many cases, the State of Vermont. *Id.*

176. System reliability is critically important to the region's economic development activities. Every survey conducted by BED of commercial and industrial customers shows that reliable power ranks above rates and service as the single most important factor for their daily operations. It is also one of the critical factors reviewed by entities considering locating or expanding in Burlington. *Id.* at 9.

177. The business community in Chittenden County has expressed support for the Project. The Burlington Business Association ("BBA") recognized that the Project "will increase the reliability of power to Burlington's businesses and residents, reduce costs and provide aesthetic benefits on the Burlington Waterfront," while also "reduce[ing] the likelihood of crippling power outages" in an "economic center . . . providing approximately 30,000 jobs." Exh. PET 12.17 (letter from BBA dated 5/29/07).

178. Similarly, the Lake Champlain Regional Chamber of Commerce ("LCRCC") and Greater Burlington Industrial Corporation ("GBIC") recognized the Project design as "the lowest cost and most environmentally sound option to address Chittenden County's significant reliability concerns," after Petitioners had "evaluated several transmission and non-transmission alternatives to the reliability problem, including energy conservation, generation and demand response." The two organizations acknowledged the reliability benefits arising from the project (referring to it as "an essential transmission improvement"), while also "welcome[ing] the fact that Project stays within the existing transmission corridors to minimize environmental impacts," and providing aesthetic benefits at the Burlington Waterfront. Exh. PET 12.17 (letter from LRCC and GBIC dated 4/19/07).

179. Fletcher Allen Health Care ("FAHC"), one of the largest consumers of power in Burlington, recognized that "patient safety and procedural support depend on a reliable quality power service," and supported the Project. Exh. PET 12.17 (letter from FAHC dated 5/4/07).

180. In a resolution adopted in March 2007, the City Council for the City of Burlington recognized the importance of the Project for remedying reliability concerns, while also furthering the interests and desires of Vermont citizens and Burlington residents to work toward removal of the lines at the Burlington Waterfront. Exh. PET 12.17 (City of Burlington resolution to proceed with the Project).

181. Frequent system outages would impose a considerable negative impact on economic growth. Kasti pf. at 9.

182. Improved reliability in the electric transmission system serving Chittenden County is important to attracting and retaining businesses and supporting a healthy business climate in

Vermont. *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at finding 558.

183. A more reliable transmission network enhances efforts to promote economic development and create jobs in Vermont. *Id.* at finding 559.

184. The proposed Project will reduce the need to run more costly generation alternatives. Nolan pf. at 8–10.

185. The expected economic growth made possible by the EAL will provide significant economic benefits that will outweigh the effects of any potential, though unlikely, increase in electrical prices associated with this Project. Foley pf. at 3.

Discussion

Pursuant to 30 V.S.A. § 248(b)(4), the Board must find that the proposed Project "will result in an economic benefit to the state and its residents" before issuing a certificate of public good.

I conclude that the proposed Project will result in an economic benefit to the state and its residents. My reason for reaching this conclusion is simple. It is clear that the status quo presents unacceptable risks of outages in the City of Burlington and surrounding communities of Chittenden County. "While we may not have a detailed, quantified estimate of the economic cost of inaction, those costs would be significant." *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at 183.

As this Board stated in Docket No. 6860, "[d]oing nothing to address reliability in a system that is already experiencing deficiencies is neither sound regulatory policy, nor likely to lead to anything but negative economic consequences." *Id.* at 184. That same conclusion applies here. I find that the Project provides an economic benefit to the residents of Chittenden County and the state as a whole.

(5) Aesthetics, Historic Sites and Water Purity, the Natural Environment, and Public Health and Safety

[30 V.S.A. § 248(b)(5)]

186. The Project will not have an undue adverse effect on aesthetics, historic sites and water purity, the natural environment, and the public health and safety. This finding is supported by findings 187 through 482, below, which give due consideration to the criteria specified in 10 V.S.A. §§ 1424a(d) and 6086(a)(1) through (8) and (9)(K).

(6) Outstanding Resource Waters

[10 V.S.A. § 1424a(d) and 30 V.S.A. § 248(b)(8)]

187. No element of the Project is located within the vicinity of the water bodies designated by the Vermont Water Resources Board as Outstanding Resource Waters, and therefore the Project will not have any effect on Outstanding Resource Waters. Nelson/Prasch pf. at 6–7.

(7) Air Pollution

[10 V.S.A. § 6086(a)(1)]

188. The Project will not cause undue air pollution. This finding is supported by findings 189 through 202, below.

189. During construction, there will be minimal, short-term, impacts from construction equipment (e.g., diesel- and gasoline-powered trucks and equipment). Minimal tree clearing will be required for the Project, but when clearing is required, trees/brush will be chipped — not burned. Dust control, when necessary, will be attained through application of water on construction access roads and other areas disturbed by construction. Stamatov pf. at 5.

190. Post-construction, there will be no air emissions from the ongoing operation of this Project. Stamatov pf. at 11.

191. The proposed Project will not produce undue noise levels. This finding is supported by findings 192 through 202, below.

192. There are no federal or state noise standards that apply to the Project. To consider the reasonableness of noise levels, Petitioners' expert applied guidelines used elsewhere. Kaliski pf. at 4.

193. The World Health Organization's "Guidelines for Community Noise" suggests noise criteria based on the most recent scientific research on noise effects. The Guidelines, published in 1999, recommend a limit of 50 dBA , averaged over the day to protect against moderate annoyance, and 45 dBA, averaged over the night to protect against sleep disturbance. *Id.* at 4–5; *see also In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at 143.

194. The U.S. Environmental Protection Agency ("EPA") has also established Protective Noise Level Guidelines. These guidelines are not intended to be applied as standards. For most residential areas, the Protective Level is 55 dBA Ldn. *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at finding 412.

195. In its decision in *Re: Hannaford Brothers Co. and Southland Enterprises, Inc.*, # 4C0238-5-EB, Findings of Fact, Conclusions of Law & Order (altered), (Nov. 27, 2002), the Environmental Board imposed noise limits of 60 dBA during the day and 50 dBA during the night for residences along US 7 (in South Burlington), and 55 dBA during the day and 45 dBA during the night for residences of the quieter Queen City neighborhood behind the proposed store. Kaliski pf. at 5.

196. In addition, the National Electrical Manufacturer's Association ("NEMA") publishes standards for noise emissions from new power transformers. These are codified in "NEMA Standards Publication No. TR-1-1993 (R2000), Transformers, Regulators, and Reactors." The standards give maximum noise levels at a distance of 1 to 6 feet from a transformer under various cooling modes by transformer size. *Id.* at 6.

197. The City of Burlington has a noise ordinance. Section 21-13 (b.1) states, "(1) General prohibition. It shall be unlawful for any person to make or cause to be made any loud or unreasonable noise." As part of the standard, any noise from power construction machinery is not permitted between 9:00 pm and 7:00 am except in emergencies. There are no quantifiable decibel limits in the ordinance. *Id.* at 6.

198. In two separate noise studies, Petitioners evaluated the noise from the Project substations using each of the above criteria, assuming the use of low-decibel equipment for the new transformer at the East Avenue substation. Based upon this analysis, the noise that will be produced by the Project substations is expected to be below the standards described above. *See id.* at 5–11; exhs. PET 17.2, 17.3, & 17.4.

199. Petitioners' expert recommended installation of resilient mounts and an absorptive three-sided sound wall around the East Avenue substation's backup transformer. The sound reduction system has been incorporated into the Project plans. Kaliski pf. at 9; Ertz, Fossun, Barrett and Askew pf. at 19–20; exh. PET 8.3.3.

200. As to the lines, the primary component of noise from transmission lines is "corona noise." Corona noise is greatest when the conductors are wet, which could occur during dense fog, rain, or snow. It can also occur when lines are dirty, such as during long dry periods. However, corona noise typically only creates public concern with line voltages at and above 500 kV. Kaliski pf. at 11–12.

201. The line voltages proposed for the East Avenue Loop (34.5 kV and 115 kV) are well below the 500 kV level at which corona noise is a problem. Therefore, corona discharge noise is not expected to rise to a level of public concern. *Id.* at 12.

202. There will inevitably be some increase in noise for certain elements of Project construction. However, construction will generally take place between the hours of 7:00 a.m. and 7:00 p.m., subject to more limited hours of construction permitted under the above-referenced City of Burlington noise ordinance. Stamatov pf. at 11.

Discussion

The models prepared by Petitioner indicate that the noise levels at the substations will not exceed any of the guidelines discussed above. Based upon this evidence, and provided the sound reduction walls are installed at the East Avenue substation in accordance with the Project plans, I find that the noise levels from the proposed Project upgrades will not be unduly adverse. I recommend, however, that VELCO be required to perform post-construction noise measurements at the East Avenue substation, and to provide the results to the Board and parties, consistent with

the recommendation of Petitioners' expert. In addition, the Board should require Petitioners to abide by the requirements of the City of Burlington noise ordinance discussed above for construction activity.

(8) Water Pollution

[10 V.S.A. § 6086(a)(1)]

203. The Project will not cause undue water pollution. This finding is supported by findings 204 through 274, below.

(a) Headwaters

[10 V.S.A. § 6086(a)(1)(A)]

204. The Project will meet all applicable health and environmental conservation regulations regarding reduction of the quality of the ground or surface waters flowing through or upon headwaters areas. This finding is supported by findings 205 through 211, below.

205. Several segments of the power line corridors are located in drainage areas of 20 square miles or less, as set forth in the definition of headwaters in 10 V.S.A. § 6086(a)(1)(A)(ii). However, no Project facilities are or will be located above 1,500 feet, as much of the route of the corridor is located on low-lying valley floors composed of upland glacial till parent material, lake and sea sands, and valley floor clays typical of the productive agricultural soils of the Champlain Valley. Nelson/Prasch pf. at 8; exh. PET 10.1 at 16.

206. Notwithstanding the definition of headwaters in Section 6086(a)(1)(A)(ii), these lands are not highly sensitive from a water quality point of view, and thus are not generally thought of as "headwaters." *Id.*

207. The potential impacts on surface waters and groundwater associated with the Project stem from both the removal of existing H-frame structures of the current 115 kV line and replacement with primarily single-pole structures for co-located 115 kV lines. Given the wide spans of the proposed power lines and the small dimensions of the proposed structures beneath the surface of the soil, the impact on ground and surface water quality will be slight. Nelson/Prasch pf. at 10, 12.

208. Any additional clearing within the ROW will have minimal effect on water quality as shrubby and herbaceous vegetation quickly re-generates. Throughout the Project area, the capacity of land to hold water due to ROW clearing will not be significantly diminished, even on steep-slope and shallow-soil areas. This is due to the replacement of the existing H-pole structures of the existing 115 kV line with primarily single-pole structures of the proposed co-located 115 kV lines, meaning approximately the same number of poles. *Id.* at 11.

209. In general, impacts associated with the Project on surface and groundwater will be minimal. Due to the implementation of erosion prevention and sediment control plans ("EPSCs"), no undue water pollution will result. Nelson/Prasch pf. at 9; *see* exh. PET 10.1 at 18–20.

210. There are several areas of steep slopes and shallow soils where particular attention to EPSCs will need to be taken, including within the valley of an unnamed tributary to the Winooski River near the Ethan Allen Industrial Park off National Guard Avenue, the Twin Bridges site in Colchester, the valley of Centennial Brook, and a short section of the 34.5 kV line within a ravine between Colchester Avenue and Riverside Avenue. The aforementioned areas have been identified by the Department of Agriculture, Natural Resource Conservation Service ("NCRS") as containing soil map units in the Highly Erodible Land Class. Nelson/Prasch pf. at 10–11.

211. Project activities within these areas of concern will be adequately protected during construction and maintenance through application of EPSCs, and requirements of the applicable ANR, Department of Environmental Conservation ("DEC") construction stormwater permitting program. These EPSC measures will be taken to ensure that adequate water quality protections are in place throughout project construction activities, and that no adverse impacts to these existing unrelated conditions will occur. *Id.* at 11.

(b) Waste Disposal

[10 V.S.A. § 6086(a)(1)(B)]

212. The Project will meet the applicable health and environmental DEC regulations for waste disposal. It will not involve the injection of waste materials or any harmful toxic

substances into groundwater or wells. Stamatov pf. at 11; *see also* findings 213 through 215, below.

213. The new East Avenue and McNeil substation transformers will each be mounted on a concrete foundation with an integral oil-retention system. The oil-retention systems have been designed in accordance with ANSI/IEEE Standard 980, IEEE Guide for Containment and Control of Oils Spills in Substations. Stamatov pf. at 11.

214. The generation of construction debris will be minimal. All construction debris will be disposed of at an approved construction and demolition debris landfill. The to-be-removed conductor wire on the 115 kV line has a high salvage value. VELCO will either sell or reuse/recycle the conductor wire. *Id.* at 12.

215. Presently, sanitary facilities (i.e., the restroom) at the East Avenue substation discharge to a septic tank/leach field system. During and following construction upgrades, sanitary waste at the East Avenue substation will be discharged to the Burlington municipal sewer system. *Id.*; April 17, 2008, letter from Kimberly K. Hayden, Esq., to Susan M. Hudson.

(c) Water Conservation

[10 V.S.A. § 6086(a)(1)(C)]

216. The Project has considered water conservation, incorporates multiple use of recycling where technically and economically practical, utilizes the best available technology for such applications, and provides for continued efficient operation of these systems. This finding is supported by finding 217, below.

217. Presently, water consumption at the East Avenue substation is insignificant, as the only water-consuming fixtures include a toilet, sink, and an emergency eye wash/shower device. The new control building will contain these same fixtures; however, the toilet will be upgraded to meet current state/federal low-flush standards. VELCO anticipates a net reduction in water consumption at this facility as a result of the upgrade. Stamatov pf. at 12.

(d) Floodways

[10 V.S.A. § 6086(a)(1)(D)]

218. The Project will not restrict or divert the flow of floodwaters or increase the peak discharge of the streams nor endanger the health, safety, and welfare of the public or of riparian owners during flooding. This finding is supported by findings 219 through 224, below.

219. There are three zones where existing pole structures are located within the 100-year floodway. Zone 1 is a broad, flat floodplain area along the eastern extent of the corridor. Twelve sequential existing pole structures, including ten within the 100-year floodway and two within the flood fringe (i.e., outside the 100-year floodway boundary, but inside the 500-year boundary) are within the floodway at this location. Zone 2 is the floodplain of an unnamed tributary to the Winooski River, located just north of the Burlington International Airport in South Burlington. Three existing structures, one in the floodway and two in the flood fringe, are within the floodplain at this location. Zone 3 is located within the vicinity of the Gorge Island in the Winooski River. Five sequential structures are located in the floodway in this area. Nelson/Prasch pf. at 15–16.

220. In addition, the VELCO Essex substation is near the 100-year floodway of the Winooski River, although a review of this area does not indicate that the floodway reaches this location due to close proximity to a water control structure for hydroelectric power, as well as steep slopes leading down from the substation to the watercourse of the Winooski River itself. *Id.* at 16.

221. The location of new pole structures within the floodway and flood fringe areas will not significantly increase the peak discharge of any river or stream downstream, nor will it otherwise adversely affect water quality or the health, safety, or welfare of the public or riparian owners during flooding. This follows because new poles will be located along the same perpendicular axis as existing poles to the extent practicable. *Id.*; exh. PET 8.1.1.

222. Also, the existing configuration of the single-circuit 115 kV line utilizes H-frame structures that are planned to be replaced with primarily single-pole structures as part of the re-designed dual circuit 115 kV lines, resulting in approximately the same number of structures as associated with the existing corridor. Nelson/Prasch pf. at 17.

223. More generally, the pole structures have a small aboveground footprint, have minimal impact on surface water flows, and are unlikely to impede or collect entrained flood debris. *Id.*; *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at finding 431.

224. The amount of fill required for the installation of the poles will not noticeably restrict or decrease flood storage capacity, nor divert flood flow patterns, due to the small footprint and amount of fill material associated with the single-pole structures. *Id.*

(e) Streams and Shorelines

[10 V.S.A. § 6086(a) (1) (E) & (F)]

225. The Project will maintain the natural condition of involved streams and will not endanger the health, safety, or welfare of the public or adjoining landowners. The Project will, insofar as possible, retain all shorelines and waters in their natural condition, allow continued access to the waters and the recreational opportunities provided by the waters, retain or provide vegetation which will screen the Project from the waters, and stabilize the bank from erosion, as necessary, with vegetation cover. This finding is supported by findings 226 through 241, below.

226. The majority of lands within the Project area drain directly to the Winooski River, or to small unnamed tributary streams, drainageways, or ditches flowing into the Winooski River. The remainder of the Project area is located within the following watersheds: Centennial Brook, Allen Brook, and Muddy Brook. Nelson/Prasch pf. at 18.

227. Petitioners have identified a total of twenty-two stream and river segments along the Project corridor from the Essex substation to the East Avenue substation, and three stream segments within the 34.5 kV portion of the Project area from the East Avenue substation to the McNeil substation. *Id.* at 18–20.

228. Several more streams are located near the Route 2A Lay-down Area, and on alternate construction access routes at St. Michael's College, the Winooski Wetland, and at the S.D. Ireland complex. Exh. PET REB 8.1 at 2–4; *id.* app. 1, at 4.

229. The total number of individual structures that will be located within 50 to 100 feet of the top of banks of streams and rivers include 32 associated with the 115 kV corridor, and two

structures associated with the above-ground portion of the 34.5 kV corridor. Nelson/Prasch pf. at 21.

230. Neither the East Avenue nor the McNeil substation is located within the immediate vicinity of any streams or shorelines. Although the East Avenue substation is located near Centennial Brook — a stormwater-impaired watershed — the lack of any new impervious area in the watershed, combined with site-specific engineering plans for oil containment and EPSCs, sufficiently protects against the possibility of adverse impacts on surface water resources. *Id.* at 24–26.

231. Off-ROW construction access routes near streams will not change the natural condition of any streams. The Gorge Road #2 route contains one stream along the western edge of the access, but the stream is not proposed to be crossed to reach Structures 43 and 44. The Winooski Park #2 Route crosses a perennial stream utilizing a preexisting concrete culvert under an established gravel drive, and thus no impacts are anticipated. After consulting with ANR, VELCO agreed to pursue use of the S.D. Ireland Alt. #2 Route, which would have fewer wetland impacts than SD Ireland #1 Route. Should a change be necessary requiring Petitioners to use SD Ireland #1 Route due to constraints imposed by the landowner, VELCO will first consult with ANR concerning wetland impacts. Nelson/Prasch pf. supp. at 7; exh. PET REB 8.1 at 2–3; exh. PET REB 7.5; exh. ANR-RP-REB 1 B.1.

232. In general, the majority of the VELCO 115kV corridor is characterized by established herbaceous and shrubby vegetation that provides structural bank stability from extensive root systems. The Winooski River shoreline along the corridor has a well-established vegetated buffer of mature trees, shrubs, and herbaceous vegetation. For the most part, the corridor crosses perpendicular to the Winooski River, which has reduced the extent of linear tree clearing associated with the existing 115 kV line. Any additional tree clearing as part of the Project will have a negligible effect on overall water temperatures. Nelson/Prasch pf. at 23.

233. A benefit of utilizing the existing corridor is that the structure and composition of vegetation within the corridor is already well established in response to the maintenance regime within the corridor. In comparison to constructing a new utility corridor for the Project, utilization of the existing corridor substantially decreases the amount of ROW clearing that will

be needed for the Project as proposed, as well as the potential environmental impacts of new clearing. *Id.* at 23.

234. ROW maintenance and construction is not anticipated to present any additional significant impact on streams and shorelines beyond the present conditions of the existing 115 kV line. Utilizing appropriate corridor-management practices, incorporating EPSCs, and providing mitigation for certain specified areas will ensure that any adverse effects on water quality are not undue. *Id.* at 21.

235. In terms of pole placement, the Project has been designed to minimize placement of structures within the top bank of surface water features. The rivers and streams along the corridor will be spanned by the conductors, leaving the channel substrate, banks, and aquatic habitat intact. *Id.* at 21–22.

236. Petitioners propose to minimize clearing of existing bank vegetation and to use appropriate EPSCs where construction for removal and/or installation of structures is necessary within the 50- to 100-foot buffer zone generally required in ANR's Riparian Buffer Zone Guidance. There are several existing H-frame structures located within this 50- to 100-foot buffer zone. These areas include the Winooski River (TB-4), Allen Brook (TB-5A), and an unnamed tributary to Winooski River (TB-10). Placement of Structures Nos. 9, 15, and 21 may need to be located within the 50- to 100-foot buffers. *Id.* at 22; exh. PET 10.5 app. 1, Sheets 4, 6, and 8.

237. Most of the stream banks are generally well vegetated with shrubby and herbaceous plant growth that quickly becomes re-established following maintenance activities. This is typical for stream banks within actively-maintained utility corridors. Nelson/Prasch pf. at 24.

238. Implementation of EPSCs and riparian plantings where necessary will provide adequate bank stabilization during and after construction. Final project plans will need to incorporate construction matting in sensitive areas, and follow established vegetation-management practices to ensure that Project pole placement does not result in undue adverse impacts to shorelines and water quality. Typical bank restoration and stabilization measures, such as coir and fiber erosion-control mats, begin stabilization of bank areas upon installation. Combined with seeding and mulching of affected areas, re-vegetation can be expected to begin

within several weeks of implementation, and dense coverage can be reestablished along banks within five years. *Id.* at 22, 25.

239. Temporary bridges and timber mats, spanning from top of bank to top of bank (minimum, where a defined bank is present) can be employed for stream crossings to minimize impacts on water quality, both within the Project corridor and on access routes except for the proposed ford to access Gorge Island in the Winooski River. Ford access to Gorge Island will be as approved in the required stream alteration permit. Nelson/Prasch pf. supp. at 8; April 17, 2008, letter from Kimberly K. Hayden, Esq., to Susan M. Hudson.

240. Construction of the Project will not affect access to streams and shorelines waters or recreational activities that presently exist. Nelson/Prasch pf. at 26.

241. Two areas near streams and shorelines were ultimately identified as requiring more particularized analysis for impacts on natural resources: the so-called Twin Bridges site where Structure 41 will be located; and the so-called Winooski Wetland (including Gorge Island and Floodplain Forest) where Structures 45 through 49 will be located. Mitigation in these areas is discussed more fully below in the sections on Wetlands and Rare and Irreplaceable Natural Areas. *Id.* at 25; Nelson/Prasch pf. reb. at 3–10, 12–17.

Discussion

Under Criterion 1(E), Petitioners have established that the natural condition of affected streams will be maintained in the long term, and that the Project's limited impacts on those streams will be temporary and will not endanger the health, safety or welfare of the public or adjoining landowners, provided the following conditions are met:

1. If required, a stream alteration permit application will be applied for and a stream alteration permit will be issued prior to fording the Winooski River.
2. The conditions contained in the stream alteration permit will be followed for fording the Winooski River; all other crossings shall be as described in finding 241.
3. If a stream alteration permit for the access to the Gorge Island is required and issued, VELCO must notify the ANR stream alteration engineer by telephone before undertaking any change to the access. Any substantial changes for access to the Gorge Island, if a stream alteration permit is

required, must be presented in writing to the ANR stream alteration engineer for prior written approval.

Petitioners will be required to observe the ANR-approved erosion prevention and sediment control plans for the proposed Project in order to ensure that the banks of any watercourses return to a condition as close to their natural condition as possible. Provided that Petitioners comply with the EPSCs, the Project will not have an undue adverse impact on streams.

Shorelines have been defined as "[t]he land adjacent to the waters of lakes, ponds, reservoirs, and rivers." 10 V.S.A. § 6001(17). The Environmental Board conducts a two-step inquiry to evaluate a project's potential impacts upon streams: "first: whether project must 'of necessity' be located on a shoreline to fulfill its purpose; and second, if so, whether project will, insofar as possible and reasonable in light of its purpose, satisfy Criterion 1(F)(i) – (iv)." *Killington Ltd., Farm and Wilderness Foundation, and Dep't of Forests, Parks, and Recreation*, #1R0813-5-EB (8/25/98).

No party has questioned whether the proposed Project "must of necessity be located on a shoreline in order to fulfill the purpose" of the Project. *See* 10 V.S.A. § 6086(a)(1)(F). In any event, this standard has been met in this case. The transmission lines will follow an existing transmission corridor for the majority of its length. This route is therefore the most economic and environmentally feasible route. In addition, it would be impossible to construct a statewide transmission system without crossing the shoreline of any rivers in Vermont. *See In re: Northwest Vt. Reliability Project*, Docket No. 6086, Order of 1/29/05 at 151. It therefore meets the necessity portion of the statute.

As to the environmental portion of the subsection, the evidence indicates that the proposed Project can be constructed to ensure that it will not have an adverse environmental impact on shorelines. 10 V.S.A. § 6086(a)(1)(F). A second component of this subsection is the requirement that a project not unreasonably interfere with access to recreational opportunities on shorelines. There is no indication, based on the evidence in this case, that access to any waters will be impaired by the proposed Project.

(f) Wetlands

[10 V.S.A. § 6086(a)(1)(G)]

242. The Project will not violate the rules of the Water Resources Board relating to significant wetlands. This finding is supported by findings 243 through 265, below.

243. A total of thirty-one individual wetlands have been identified as being partially or fully located within the Project's corridor, including fourteen Class Two wetlands and seventeen Class Three wetlands. The wetlands themselves in most cases extend beyond the boundaries of the corridors and the substation property lines, in some cases extensively. Nelson/Prasch pf. at 30–31.

244. Petitioners completed natural resource analyses of the off-ROW construction access routes, and identified that crossings will be required for sections of the Winooski Wetland (the so-called "Winooski Park #2" Route) and a portion of Wetland 2007-12 located near the Floodplain Forest. A wetland identified at the Route 2A Lay-down Area is small, isolated, and disturbed, and has no principal function or value. Nelson/Prasch pf. supp. at 7; exh. PET REB 8.1 at 2–4.

245. Generally speaking, outside of the Winooski Wetland, impacts associated with pole placements in the identified wetlands will be small (approximately 100 square feet), or temporary in nature. Such general impacts can be minimized through appropriate EPSCs and use of construction matting where appropriate. Nelson/Prasch pf. at 32.

246. The Winooski Wetland is one wetland area requiring specialized construction practices by Petitioners. In order to remove existing structures and install Structures 45 through 48, Petitioners will access and conduct construction activity through several interconnected wetlands in the active floodplain of the Winooski River, located to the east of downtown Winooski and west of Interstate 89. *Id.* at 32–33; exh. PET 10.5 app. 2, Sheets 16–19; exh. PET REB 8.1, Attachment Sheets 16–19.

247. While the wetlands within the Winooski Wetland complex are neither particularly rare nor extremely sensitive, they are important wetlands in that they serve multiple principal functions that the Vermont Wetland Rules are designed to protect. Nelson/Prasch pf. at 33.

248. ANR has expressed concern in particular regarding the wildlife and migratory bird habitat function and value, based on observations regarding wood duck and other waterfowl. Austin pf. at 3–5; Foley pf. at 3.

249. In response to the ANR's concerns as to the potential impacts to bird breeding associated with active work in the Winooski Wetland, Petitioners have worked with ANR to develop a framework for mitigating the potential construction impacts. Exh. ANR-RP-REB 1 at A.4.

250. Pursuant to an understanding reached with ANR, Petitioners propose to complete the Project-related work in the Winooski Wetland in two stages. The first stage would fall during the period between the last quarter of 2008 through the second quarter of 2009 (which will involve most of the pole-foundation work and structure assembly). Subject to weather, availability of work crews, and permit restrictions, Petitioners anticipate this stage should take approximately 3 to 4 weeks of construction activity, plus approximately one week of "down time" required to allow the concrete foundations to cure. In the event that a temporary dam is required to access the Gorge Island (as discussed further below), assembly and installation of the dam would occur prior to work on pole structure foundations. Exh. ANR-RP-REB 1 A.5.

251. Petitioners plan the second stage to take place sometime between July 15 through the Fall of 2009. Subject to weather, availability of work crews, and permit restrictions, that stage should take approximately 2 to 3 weeks (including time for removal of existing structures). Removal of matting and the temporary dam and site restoration work would occur after the completion of the second phase. *Id.* at A.1.

252. The timing of the second stage of work is intended to avoid potential disturbance during the bird breeding season (May–July 15) in the wetland, as well as to enable that access to Gorge Island occurs during typical summer/fall low-river-flow conditions. Petitioners intend to spend as little time in the Winooski Wetland as possible to complete the two construction stages. *Id.*

253. In addition to the two-stage approach to construction, Petitioners and ANR have worked closely on the determining a suitable access route to reach Structures 45–48. Although Petitioners had originally intended on using the "Winooski Park #1" route that runs along the

perimeter of the wetland through the floodplain forest, Petitioners and ANR have since agreed that Petitioners shall use "Winooski Park #2" for accessing the corridor. The alternate route was chosen to avoid clearing of silver maple forest along the banks of the Winooski River. Petitioners and ANR will continue a dialogue concerning whether construction personnel may use a motorized vehicle no larger than an ATV on the "Winooski Park #1" route for limited purposes. Exh. ANR-RP-REB 1 at A.2; Nelson/Prasch pf. reb. at 5.

254. Next, Petitioners and ANR have agreed upon a specific condition for accessing the corridor, as follows:

For work in the Winooski Wetland, a sequence of preferred timing on work is: first, Nov 1 through March 15; then under dry conditions using the "dry evaluation procedure" to determine whether mats are required; and lastly, using matting. In all cases, no observable ruts shall remain after restoration of areas of disturbance.

Exh. ANR-RP-REB 1 at A.3.

255. Based on recent experience of matting in rare and irreplaceable natural area ("RINA") wetlands associated with the Northwest Vermont Reliability Project ("NRP") 345 kV line, the parties have observed that matting has only a temporary impact on wetlands. Herbaceous vegetation, such as reed canary grass, has been shown to re-vegetate following removal of matting. Placement of matting also prevents soil compaction and rutting that can be associated with some construction activities. Nevertheless, to minimize the impact of matting used for accessing the Winooski Wetland, all mats should be removed as quickly as practicable. *Id.*; Nelson/Prasch pf. reb. at 6–7.

256. A Conditional Use Determination ("CUD") from ANR will be required for construction in the Winooski Wetland. Exh. ANR-RP-REB 1 at A.3.

257. Mats and erosion control utilized during construction are designed to have no netting associated with them that could entrap snakes or other reptiles, and construction mats used in the Winooski Wetland will be either elevated or bridged in accordance with the CUD conditions, to allow for amphibian passage. Petitioners have agreed that the construction mats will be thoroughly cleaned of any adhering seeds or soil prior to placement. *Id.*

258. During the installation of the matting itself, Petitioners have proposed to have an environmental team member on site to minimize impacts to flora and fauna in the Winooski

Wetland, by endeavoring to, for instance, avoid dens, burrows, etc., and areas of native vegetation, and place matting in areas of reed canary grass wherever practicable, and would not otherwise interfere with or require a modification to any permit or approval obtained for the Project. VELCO will continue its dialogue with ANR concerning use of mats to access the Winooski Wetland, but has represented that it has no objection to a CUD condition for the Project that would require monitoring for invasive species, such as phragmites and loosestrife, for the term of the CUD, in accordance with its Transmission Vegetation Management Plan. *Id.*; exh. PET REB 9.1 at 9.

259. The conditions associated with construction access will reduce the Project's impacts on wetlands, but Structures 47 and 48, located on Gorge Island (also known as "Caitlin Island") pose a more specialized access challenge. At the time of the technical hearings, Petitioners anticipated that a mobile dam or other similar device with temporary fill material would be used for Petitioners' temporary construction access to Gorge Island. This would require diverting flow within the northern channel of the Winooski River for varying periods of time. Exh. ANR-RP-REB 1 at A.5.

260. As of April 1, 2008, the Petitioners, in consultation with ANR, have agreed that the best crossing and access method will involve fording the river. The Petitioners will obtain any necessary stream alteration permits for this activity. *See* letter dated April 17, 2008, from Kimberly K. Hayden, Esq., to Susan M. Hudson; exh. ANR-RP-REB 1 at A.5.

261. In addition to the other wetland mitigation measures previously discussed, Petitioners are agreeable to a condition that would preclude structure construction and matting work in the Winooski Wetland from the period of May 1st to July 15th — in essence, a "Stop Work" period. The condition will not preclude VELCO from undertaking preparatory work for structure installation in the Winooski Wetland between May 1 and July 15, as long as it is undertaken on foot. Exh. ANR-RP-REB 1 at A.4.

262. To further reduce potential impacts to the wetland associated with construction vehicles and human activity, matting for the first stage of construction may be left in place during the "Stop Work" period; however, Petitioners have agreed not to install additional mats necessary for the second stage of construction until after the "Stop Work" period. *Id.*

263. If maintenance or stabilization of the temporary structure to Gorge Island is required, ANR is prepared to allow Petitioners to maintain or stabilize the temporary structure by means of one or more trips during the "Stop Work" period. Required work would be subject to ANR approval. *Id.*

264. Outside of the Winooski Wetland, the only other significant wetland identified for Project impacts was Wetland 2007-12, located near the S.D. Ireland construction complex near the south side of the Winooski River, and close to Structures 49 and 50. Exh. ANR-RP-REB 1 B.1; exh. PET REB 7.6.

265. After consulting with ANR, VELCO agreed to pursue use of the S.D. Ireland Alt. #2 Route, which would have fewer wetland impacts than the S. D. Ireland #1 Route. Should a change be necessary requiring Petitioners to use the S. D. Ireland #1 Route due to constraints imposed by the landowner, VELCO will first consult with ANR concerning wetland impacts. Nelson/Prasch pf. supp. at 7; exh. PET REB 8.1 at 2–3; exh. PET REB 7.5; exh. ANR-RP-REB 1 B.1.

(g) Water Supply

[10 V.S.A. § 6086(a)(2) and (a)(3)]

266. The Project will not burden existing water supplies. Water consumption at the East Avenue substation is negligible and, once the facility is upgraded with new restroom facilities, VELCO anticipates a net reduction in water consumption. Stamatov pf. at 13.

(h) Soil Erosion

[10 V.S.A. § 6086(a)(4)]

267. The Project will not cause unreasonable soil erosion or reduction of the capacity of the land to hold water so that a dangerous or unhealthy condition may result. This finding is supported by findings 268 through 274, below.

268. Petitioners will obtain and observe the terms and conditions of state stormwater discharge permits issued by ANR. Nelson/Prasch pf. at 35.

269. Since the total extent of earth disturbances associated with the Project will be in excess of one acre, Petitioners will be required to file applications for state stormwater discharge permits containing detailed EPSCs to be implemented during the principal construction activities, and a site-stabilization plan. *Id.* at 35–39.

270. Examples of typical effective erosion control measures employed as part of an EPSC include: siltation fencing and hay bales; culverts (repair of existing and installation of new); stabilized construction entrances or mud traps; water bars; check dams; drainage ditches; mulching and seeding; and ground-cover restoration. The selection of each type of erosion control measure will depend on field-specific conditions. Stamatov pf. at 19.

271. VELCO reinforces its obligation to properly implement EPSCs and other types of erosion prevention through a combination of contractor-training programs focused on installation and maintenance, as well as periodic inspections by contractors working with environmental monitors. *Id.* at 19–20.

272. Subject to a calculation of soil disturbance as a result of construction, VELCO will apply for an individual state stormwater discharge permit or coverage under the Construction General Permit 3-9020 ("CGP") for work within the 115 kV project corridor. Consistent with past practice on the NRP and Lamoille Projects, VELCO will seek a separate permit or authorization for its work at the East Avenue substation. Exh. ANR-RP-REB 1 at 7.

273. BED will apply for separate coverage under the CGP for its own work within the 34.5 kV line and at the McNeil substation, as required. *Id.*

274. No operational (post-construction) stormwater permit will be required because the Project does not involve the addition or redevelopment of more than one acre of impervious surface. *Id.*

(9) Transportation Systems

[10 V.S.A. § 6086(a)(5)]

275. The Project will not cause unreasonable congestion or unsafe conditions with respect to transportation systems. This finding is supported by findings 276 through 290, below.

276. The two 115 kV single-pole transmission lines extending from VELCO's Essex substation to the East Avenue substation will be constructed north of Burlington International Airport in the same right-of-way as the existing 115 kV transmission line. None of the existing structures are located in flight paths, nor will any new structures obstruct ground vehicles heading to and from the airport. Ertz pf. at 4.

277. On average, the pole heights associated with the new lines will be 16 feet higher than the existing H-frame structures, with a handful of structures having height increases exceeding 27 feet. This increase in pole height will not affect airport operations. *Id.*

278. Generally, only structures above 200 feet are required to be lit or marked pursuant to Federal Aviation Administration ("FAA") regulations (with an exception made for certain structures that are closer to an airport that have the perceived potential to interfere with flight paths). The elevation of the existing 115 kV ROW running north of the Burlington International Airport is substantially below the runways. In the areas of the 115 kV line that are higher in elevation, such as the area near the Gorge substation and the Centennial Forest/Centennial Field area, the poles will be substantially shorter than other existing unlighted and unmarked structures (e.g., the lights for Centennial Field). *Id.* at 4–5.

279. The Petitioners notified the FAA of the East Avenue Loop project on March 21 and 27, 2007. Petitioners will inform the Board and parties if the FAA requires any marking or lighting of the new structures. *Id.* at 5–6.

280. The East Avenue Loop Project will cross a railroad line at one point adjacent to the McNeil Generating Station; this crossing will not have an adverse effect on railway transportation systems. *Id.* at 6.

281. During construction of the Project, the Vermont Railway line will be crossed at two points east of Interstate 89 to construct Structures N-43 and S-43, and Structures N-41 and S-41. These crossings will be intermittent and will be for short durations to prepare the site, to set the structures, and later to install the conductor. Crossings will be scheduled and coordinated with the railway operator. These crossings will not have an adverse impact on rail operations. *Id.*

282. The overhead portions of the 115 kV and 34.5 kV lines span nine public roads, including Interstate 89. These crossings will not affect traffic because the lines will maintain the

clearances required by National Electric Safety Code between road surfaces and conductors at each location. *Id.*

283. The traffic and congestion attributable to construction activities will be kept to a minimum because most of the construction will occur away from major roads and state highways, with the exception of Structures N-44 and S-44 off of I-89. In the areas near roads, the Petitioners will carefully plan their work to minimize congestion and delays; ideally, construction will occur during areas of reduced activity. *Id.* at 7.

284. The Williston Lay-down Area, while being located close to Interstate 89 and Route 2A, is in an area of Williston with relatively less traffic than Route 2, Route 2A, and the Taft Corners area north of Interstate 89. The traffic levels are such that existing residents and businesses along this portion of Route 2A will be unlikely to notice a major increase in traffic due to use of the lay-down area. Ostrander pf. reb. supp. at 9.

285. The greatest amount of activity expected at the Williston Lay-down area will be ten trips per week, during early stages of construction, and when mats are being staged. As construction progresses, there will be fewer and fewer trips from the lay-down area. *Id.* at 9–10.

286. Both substation sites are well away from city streets, which will help minimize traffic impacts. Minimal traffic will result from maintenance activities for the lines and substations. Ertz pf. at 7.

287. The 34.5 kV line will cross Centennial Field Road and Colchester Avenue underground. To make provisions for the conductor and to install it, a trench will be excavated perpendicular to the street. The trench is expected to be open for 2 to 3 days. This will likely create the need for a detour and affect traffic flow for this short period, but only on one side of the street. *Id.*

288. No roadwork will be required in connection with the installation of the 34.5 kV line running below Riverside Avenue, because the line is being installed within an existing underground conduit. *Id.*

289. The Project's 115 kV lines will cross the Winooski River in several locations. Because the Winooski River is a Section 10 waterway, as defined by the U.S. Army Corps of Engineers, the U.S. Coast Guard requires that the conductors for the two 115 kV transmission

lines be at least 33.25 feet above the ordinary high-water level, ensuring sufficient vertical clearance required for watercraft passage. *Id.* at 8; exh. PET 8.2.2.

290. The Project has no negative impact on bicycle paths in the area and is likely to have a positive visual impact on the bicycle path located along Burlington's Waterfront because of the removal of the BED lines associated with its Lake Street substation. Ertz pf. at 9.

(10) Educational Services

[10 V.S.A. § 6086(a)(6)]

291. There will be no impacts on educational services in Chittenden County, as the Project will not result in an increase in the student population in the affected communities. Moreover, the Project will not impede the ability of local municipalities to provide educational services. If anything, the improvements in reliability will ensure that educational institutions in the region — ranging from elementary schools to the UVM medical school — will be less likely to experience a prolonged outage in a worst-case system failure scenario. Stamatov pf. at 13.

(11) Municipal Services

[10 V.S.A. § 6086(a)(7)]

292. The Project will not place an unreasonable burden on the ability of the affected municipalities to provide municipal services. This finding is supported by findings 293 through 295, below.

293. Once completed, the Project will not require any additional support services from local fire departments or law-enforcement officers. Some coordination with traffic-enforcement services may be necessary in order to deliver equipment to the Project right-of-way and/or construction access areas; however, such coordination tends to occur sporadically, and only for short time periods. Stamatov pf. at 13–14.

294. The small amount of construction debris to be generated during construction will not compromise existing regional solid waste facilities. *Id.* at 14.

295. Use of the Williston Lay-down area is not expected to burden municipal services. VELCO may have occasion to ask for police assistance with traffic. Ostrander pf. reb. supp. at 10.

(12) Aesthetics

[10 V.S.A. § 6086(a)(8)]

296. The Project will not have an undue adverse effect on aesthetics or on the scenic or natural beauty of the area. This finding is supported by findings 298 through 375, below.

297. The Petitioners and the Department entered into an MOU regarding aesthetics to resolve any issues between them. Exh. PET REB 6.2.

(a) The 34.5 kV Line, Changes at Burlington Waterfront, and Williston Lay-down Area

298. The visual impacts associated with the new 34.5 kV line will be extremely limited. The removal of two poles (pole #2536 and pole #2535) north of Colchester Avenue will eliminate existing visual impacts to houses along Colchester Avenue and Nash Place. There will also be some minor impacts where the line transitions and then runs overhead down Intervale Road. Buscher pf. at 16.

299. The visual impacts based on the addition of equipment at the McNeil substation will also be negligible. There are extremely limited views of the McNeil substation from the surrounding area, and those views may be measured in the context of the adjacent generation facility: infrastructure related to the generation facility, including the cooling tower, large fuel storage tanks, storage for the wood chips, etc., is the predominant feature of this area. Considering this context, the Project's aesthetic impacts at McNeil are not adverse. *Id.* at 16–17; exh. PET 9.2 at 56.

300. The Burlington Waterfront is crossed by numerous electrical transmission and distribution lines that impair the scenic quality of Lake Champlain. As part of this Project, certain equipment from the BED Lake Street substation that is visible from portions of Waterfront Park will be removed. Two sections of existing BED overhead distribution circuits

will also be removed from the Waterfront. The first section is one of the two circuits passing over Waterfront Park; the second section crosses over the Waterfront Skate Park and continues up a steep embankment along the west side of Battery Park. Buscher pf. at 17; exh. PET 9.2 at 56–58.

301. The removal of the Lake Street distribution equipment and lines will result in substantial improvements to the visual character of the Burlington Waterfront, and can properly be said to attenuate adverse visual effects of utility infrastructure on the Waterfront. *Id.*

302. The Williston Lay-down Area, located between Hurricane Lane and Old Creamery Road on the portion of Rout 2A that extends between Williston and St. George, is proposed for use as a staging area for delivery and distribution of Project materials. Ostrander pf. supp. reb. at 3.

303. As a result of an existing dense hedgerow and mature woods bordering the Lay-down parcel, and given the temporary use of the area, there will not be any adverse aesthetic impacts to this area. *Id.* at 8–9; exh. PET. REB 7.8.

(b) The 115 kV Corridor

304. The approximately 4.8-mile VELCO 115 kV transmission line corridor is a long-established 115 kV transmission line corridor and is part of the existing working landscape which, for the most part, avoids roadways and residences. Buscher pf. at 8; exh. PET 9.2 at 5.

305. As part of the Project, single-pole structures will predominantly be used instead of the existing 115 kV H-frame design. Essentially, having two poles for the existing H-frame structures replaced by two poles for the new 115 kV single-pole structures, results in no net increase in vertical elements. Buscher pf. at 10.

306. The single-pole design will also allow the Project to remain within the existing corridor, thereby limiting new tree clearing. The design of the line also utilizes parallel pole placement to the extent possible, which in turn avoids a cluttered or disorganized appearance. *Id.*

307. All of the poles on the new lines will be wood or self-weathering steel. These materials will be compatible with the appearance of the existing wooden structures. In addition,

the conductors will be a non-specular (non-shiny) wire, which minimizes the visibility of the wires. *Id.* at 11.

308. The aesthetic experts for the DPS and Petitioners assessed the potential visual impacts of the Project and potential mitigation measures to reduce aesthetics impacts within the 115 kV corridor, and concluded that while there are areas of adverse aesthetic impacts within the corridor due to the Project's increased pole heights and wider spread between poles, the following mitigation actions prevent any adverse impacts from being undue:

- Use primarily of single poles with davit arms instead of two H-frame circuits within the corridor. This design avoids having to obtain and clear additional right-of-way ("ROW"). H-Frame construction will be used at the Interstate 89 crossing to maintain line alignment based on public input, and at three of the Winooski River crossings to minimize pole heights due to the length of the spans.
- Use of self-supporting and self-weathering steel poles in some areas, which eliminates the need for guy-wires and their related visual clutter.
- Use of non-specular conductor to reduce glare.
- Reduced pole heights from original design by 10–15 feet.
- Modified structures from original design to avoid aesthetic or environmentally-sensitive areas (e.g., River Cove Re-route).
- Implementation of proposed mitigation plantings (exh. PET 9.2 Sheets L2–L3) subject to any conditions or modifications described in the aesthetics MOU, Exhibit PET REB 6.2, and subject to landowner approval, for each area of visual sensitivity.

Exh. PET REB 6.2 at 2.

309. Additionally, the Project's impacts are tempered by the fact that the 115 kV line is a pre-existing corridor with electrical transmission infrastructure that has been in place for decades; surrounding land uses have taken this into account. *Id.*

310. In their review of the Project, the aesthetic experts for DPS and Petitioner identified nine locations along the 115 kV line corridor, together with the East Avenue substation, that were deemed aesthetically sensitive. These are various points where the transmission line corridor crosses public roadways, passes in close proximity of residences, or traverses publicly owned lands. The areas that contain views and have potential for adverse visual impacts include:

- East Avenue substation
- Route 2A crossing
- Winooski River crossings
- River Cove Road
- Muddy Brook Park
- Country Club Estates
- Shamrock Road, Airport Parkway, and Gorge Area
- Interstate 89 crossing
- Valley Ridge/Patchen Road Area
- Centennial Woods and Patchen Road Park

Id. at 2–6.

(c) East Avenue Substation

311. VELCO's existing East Avenue substation is located within the University of Vermont's ("UVM") Centennial Campus in Burlington. Accessed from East Avenue on University Road, the substation is located among maintenance and operational facilities for the campus, a parking lot, and Centennial Field. Buscher pf. at 14.

312. To the north of the substation, there is a partly paved and partly gravel parking lot. To the west, there are a number of maintenance facilities, including a repair shop which will be relocated as part of the Project. South of the substation, the topography drops steeply into the Centennial Woods area. This area is also where the Essex to East Avenue 115 kV transmission line (K-25 line) accesses the substation. *Id.*

313. Existing views of the East Avenue substation are primarily from the aforementioned areas. Views are not of a high scenic value, but reflect a more industrial character associated with outdoor storage, maintenance activities, and vehicles. *Id.*

314. An existing cedar hedge to the north of the substation provides a substantial visual screen for the adjacent UVM parking areas, as well as for residences further north of the parking area. *Id.*

315. As part of the Project, the overall size of the East Avenue substation will be expanded to accommodate the second 115 kV line, transformer, and related equipment. The expansion of the substation footprint will not itself create a noticeable increase in visual impacts; more noticeable will be the amount of equipment visible above the cedar hedge. Exh. PET 9.2 at 49–50.

316. The height of the new equipment, including H-frames to support the incoming lines, will only be approximately 5 feet taller than the existing equipment. *Id.* at 50.

317. The Project's adverse impacts in this area will be mitigated by the placement of fence and hedgerow between the substation and the parking lot to the north, and the removal of overhead utilities. In addition, the landscape mitigation plantings as shown on Exhibit PET 9.2, Sheet L3.0, provide reasonable and effective mitigation for this area. Exh. PET REB 6.2 at 4–5.

318. Because VELCO and UVM have agreed to work together regarding ROW clearing and aesthetic mitigation, following completion of construction, VELCO will seek written verification from UVM regarding satisfaction with the aesthetic mitigation undertaken on UVM's property. Copies of any such verification shall be provided to the DPS and to the Board. *Id.*

319. While UVM requested removal of the original proposed aesthetic mitigation plantings at the north east corner of the substation, VELCO will revisit this area with UVM after construction, and, if requested by UVM, will provide additional mitigation for this section of the substation consistent with, but not to exceed, the original proposal. *Id.*

(d) Route 2A Crossing

320. There will be no adverse impacts to the Route 2A crossing, due to the landscape mitigation plantings shown on Exhibit PET 9.2, Sheet L2.0. The proposed plantings are reasonable and improve the existing screening. Exh. PET REB 6.2 at 2.

(e) Winooski Crossing #1

321. The "Winooski Crossing #1" occurs between Structures #9 and #10 in the Town of Williston, adjacent to the River Cove Road, and is the first of six locations where the K-25 line corridor crosses a portion of the Winooski River. Exh. PET 9.2 at 14–15.

322. At the Winooski Crossing #1, structures S9 and N9 were carefully sited away from the river bank, and the poles will be separated from the river by a low vegetative screen. West of the river, proposed Structures #10 have been located at the top of the bank and River Cove Road. During the design process, careful attention was given to the placement of these structures to allow sufficient setbacks from both the river and from River Cove Road. *Id.* at 15–16.

323. Additional plantings will be made in accordance with Exhibit PET 9.2, Sheet L2.1, to help replace encroaching vegetation that will be removed due to normal ROW maintenance. The additional plantings will be consistent with ANR's December 2005 Guidance for Agency Act 250 and Section 248 Comments Regarding Riparian Buffers and with previous requirements for transmission crossings at rivers made by ANR. Exh. PET REB 6.2 at 3.

324. Plantings will be field-located after construction to most effectively respond to as-built conditions and to reclaim any disturbance in these riparian buffers. *Id.*

325. The remaining Winooski River crossings are already cleared to the full ROW width and their riparian buffers are not expected to be disturbed. In the event these areas are disturbed, similar plantings as shown on sheet L2.1 will be implemented consistent with ANR's December 2005 Guidance for Agency Act 250 and Section 248 Comments Regarding Riparian Buffers, and with previous requirements for transmission crossings at rivers made by ANR. *Id.*

326. Provided the mitigation measures described in the MOU between Petitioners and DPS and in Petitioners' aesthetics testimony are undertaken, there will be no violation of any community aesthetic standards related to the Winooski River. *Id.*

(f) River Cove Road

327. The lines from Structures #10 continue across River Cove Road in the Town of Williston and into an open agricultural field south of River Cove Road. The open view from River Cove Road west into the agricultural setting elevates the sensitivity of this area. Exh. PET 9.2 at 16–17.

328. The Town of Williston Comprehensive Plan recognizes the scenic importance of this area. However, the transmission corridor already exists in this area, and the Comprehensive

Plan encourages the Public Service Board to require that new transmission lines be located within existing utility corridors, as is the case with this Project. *Id.* at 16.

329. Although there are views down the corridor to the west, the brief views are based on a break in roadside vegetation lasting for approximately 300 feet. The view will be of very limited duration to the traveling public. *Id.*

330. Existing Structure #11 is within close proximity of where the lines cross River Cove Road and is in alignment with views down the road as vehicles travel west. The new structures #11 will be placed 200 feet further to the west than the existing structure, which will result in travelers approaching the structures at a substantially different angle. This new angle will reduce travelers' ability to see the new structures, and will greatly attenuate the prominence of the existing structures #11 in the viewshed. *Id.*

331. The DPS's and Petitioners' experts agreed that the Project's adverse aesthetic impacts in this area will be mitigated by:

- Retention of the existing hedgerow along the southern edge of River Cover Road between Structures #11 and just beyond #14, as shown on Exhibit PET 9.2, Sheets L2.1–L2.3;
- Landscape mitigation plantings as shown on Exhibit PET 9.2, Sheets L2.1–L2.3, which are reasonable and will supplement existing screening along the south side of River Cove Road; and
- Elimination of Structures #16.

Exh. PET REB 6.2 at 2.

(g) Muddy Brook Park

332. After Muddy Brook Creek, the lines cross into the City of South Burlington and a recreational park — the Muddy Brook Park — maintained by the WVPD. Exh. PET 9.2 at 21.

333. Muddy Brook Park is accessed from a small parking area off of National Guard Avenue (which becomes River Cove Road at the Williston/South Burlington boundary). Structures #18 through #21 will be located within the park boundary. *Id.*

334. Above-ground pole-height increases for Structures #18 will be 31½ feet for N18 and 27 feet for S18. Height increases are significantly less for Structures #19–#21. *Id.*

335. The Muddy Brook Park segment went through a series of design investigations to help determine the best solution to reduce aesthetic and environmental impacts. The increases in height for Structures #18 were determined to be preferable to the addition and rearrangement of other pole structures. Structures #18 were also moved further west from the existing Structure #18 location, to a more remote and less prominent location within the park. *Id.*

336. Although the Project will have adverse aesthetic impacts at Muddy Brook Park, Petitioners have adopted reasonably available mitigation measures by, among other things, proposing to move Structures #18 away from the dominant view. Exh. PET REB 6.2 at 3.

337. The Project's adverse impacts in this area will also be mitigated by landscape mitigation plantings as shown on Exhibit PET 9.2, Sheet L2.4 (revised 2/21/08), which have been developed in consultation with the WVPD. *Id.*; exh. PET 12.18.

338. Access to the park trails will be maintained throughout construction of the Project. *Id.*

339. Riparian buffer areas are not expected to be disturbed. In the event these areas are disturbed, similar plantings as shown on sheets L2.1 (revised 2/21/08) will be implemented consistent with ANR's December 2005 Guidance for Agency Act 250 and Section 248 Comments Regarding Riparian Buffers and with previous requirements for transmission crossings at rivers made by ANR. Exh. PET REB 6.2 at 3.

(h) Country Club Estates

340. Country Club Estates is an isolated, densely developed residential area along the 115 kV corridor in the City of South Burlington. The residences were built around the pre-existing utility corridor with electric transmission lines, including the VELCO K-25 115 kV line and two Green Mountain Power 34.5 kV lines on single H-frame structures. Exh. PET 9.2 at 23; exh. PET REB 6.2 at 4.

341. Although the immediate area around Country Club Estates is not highly scenic, the close proximity of the corridor to the residential properties indicates that the area — spanning from Structures #26 through #30 — is sensitive. Exh. PET 9.2 at 24–25.

342. Country Club Estates is accessed by National Guard Avenue, along which the corridor is visible. The corridor is also visible from Mountain View Drive and Country Club Drive. Exh. PET 9.2 at 23.

343. While distant, there are impressive scenic views of the Green Mountains to the east of the Country Club Estates neighborhood.

344. The clearing that exists as a result of vegetation management of the VELCO K-25 corridor helps to open up the impressive scenic views of the distant Green Mountains. Exh. PET 9.2 at 25; exh. PET REB 6.2 at 4.

345. The corridor passes across the entrance to the neighborhood where a common green space with tennis courts has been created in the cleared area under the existing transmission lines between Country Club Drive and Mountain View Drive. *Id.* at 23, 27.

346. Currently, two K-25 115 kV H-Frame structures, #28 and #29, and a single H-frame for the Green Mountain Power line, are sited in this field. Petitioners propose to relocate Structures #28 to the east of Mountain View Drive, while locating Structures #29 more centrally in the green space. These relocations will result in a net loss of two poles within the green, and will potentially improve views to the east. *Id.* at 23.

347. A residence was built in close proximity to Structures #30. Petitioners propose to offset Structures #30 to the greatest extent away from this residence, and also propose utilizing single-pole structures without davit arms to minimize clearing impacts. *Id.* at 25.

348. Chapter 6, Sections E and F of the 2001 South Burlington Comprehensive Plan (Pages 40–41) contain goals and recommendations for protecting residential neighborhoods from potentially incompatible land uses. The Project complies with these provisions. Any adverse impacts from the Project in this area will be mitigated and addressed by the design changes proposed for Structures #27–#30, together with the landscape mitigation plantings shown on Exhibit PET 9.2, Sheets L2.5–L2.6 (revised 2/21/08); exh. PET REB 6.2 at 4.

(i) Shamrock Road, Airport Parkway, and Gorge Area

349. In the City of South Burlington, the Project 115 kV corridor is visible from road

crossings at Shamrock Road and Airport Parkway. The landscape character at these crossings is predominantly industrial. Exh. PET 9.2 at 30–31.

350. While older development predominates in this area, considerable new development has appeared over the past several years, including several new apartment and condominium projects, the reconstruction of the Camel's Hump Bridge spanning the Winooski River, and improved facilities at the WVPD Gorge Recreational Area ("Gorge Park"). *Id.* at 30.

351. Minimal visual impact is expected for Gorge Park, given the topography and proximity of tree cover to the Park trail. There are no views of existing structures from Gorge Park, and the proposed structures will be located at the same locations. Height increases for each new structure will be less than 10 feet. *Id.* at 30, 33.

352. There are no views expected of the new structures from the Gorge Park area. *Id.* at 33.

353. Landscape mitigation plantings as shown on Exhibit PET 9.2, Sheet L2.7, provide reasonable and effective mitigation for this entire area. Exh. PET REB 6.2 at 4.

354. Petitioners will use best efforts to coordinate plantings with the arborist for the City of South Burlington. *Id.*

(j) Interstate 89 Crossing

355. As the lines continue from the Gorge Park area in Winooski, they cross over Interstate Highway 89 (the "Interstate") just north of the Winooski River Bridge. The current views from the Interstate in this area are primarily limited to conductors of the existing circuits, although existing structures on either side of the Interstate are visible when vehicles are within close proximity to the crossings. Exh. PET 9.2 at 38.

356. When traveling northbound, intervening vegetation screens the 115 kV structures on both sides of the Interstate during the extended approach. When vehicles are directly within the crossing, full views are possible of both structures; however, these views are out of the normal cone of vision, and the duration of the view is extremely short. *Id.*

357. Traveling southbound, the eastern structure is visible for a slightly extended duration of time, and views to the southeast of Structures #43 and #42 are possible for a short duration. *Id.*

358. The proposed structures on either side of the Interstate will be placed at the same locations as the existing poles. Structures #43 will only be 4 feet taller than the existing structure; Structure #N44 will be 14 feet taller, and Structure #S44 will be 9 feet taller. *Id.*

359. All new structures at the Interstate crossing will be designed using self-supporting steel, allowing for elimination of the third pole that currently exists at Structure #43; all guying will be eliminated. *Id.*

360. Originally designed with single-pole structures west of the Interstate, this crossing was revised to retain the H-Frame horizontal configuration, resulting in a lower profile and reducing the structure's visual presence at this location. *Id.*

361. A new route has been identified to access Structures #44 from the north through an old road bed, resulting in no impact to existing screening along the western edge of the Interstate. Exh. PET REB 6.2 at 5.

362. Existing vegetation along the eastern edge of the Interstate will be retained, except to the extent that it is cleared as part of VELCO's regular maintenance cycle. *Id.*

363. Given that the construction of the Project will not require widening of the existing corridor, plantings as shown on Sheet L2.8, with careful post-construction location to provide maximum screening benefit, along with existing growth, will provide reasonable additional screening. *Id.*

(k) Valley Ridge/Patchen Road Area

364. The WVPD Valley Ridge property in South Burlington does not contain any marked trails or other developed recreation areas. The VELCO corridor for the K-25 line crosses only a small corner of the parcel, and views from public viewsheds are limited. Exh. PET 9.2 at 43.

365. As the corridor crosses Patchen Road and Grove Street, it comes within view of several residential and commercial properties to the west, and the Valley Ridge neighborhood to

the east. Currently, the crossing is very well screened due to the narrow road corridor and heavy roadside vegetation. *Id.*

366. Additionally, there are no direct views from the Valley Ridge neighborhood, although the corridor directly abuts residential units sited on the east side of the Ireland Grove Street property. *Id.*

367. Clearing between the corridor and the Valley Ridge neighborhood will be limited to the current ROW. An adequate buffer will be maintained with no expected danger-tree clearing in the area due to the topography. Exh. PET REB 6.2 at 5.

368. Landscape mitigation plantings as shown on Exhibit PET 9.2, Sheet L2.9 (revised 2/29/08), provide reasonable and effective mitigation for this area. *Id.*

(l) Centennial Woods & Patchen Road Park

369. Centennial Woods is a natural area at the limits of the City of Burlington that is open to the public. The land is owned by UVM, and concern for the Project's potential impacts in this area was expressed early in the public outreach process. Exh. PET 9.2 at 46.

370. The aesthetic analysis, including field investigation, revealed that the new poles in this area will be visible primarily from within Centennial Woods, with some minor views expected from Centennial Field and the surrounding area. *Id.* at 48.

371. VELCO and UVM have agreed to work together regarding ROW clearing and aesthetic mitigation. Following completion of construction, VELCO will seek written verification from UVM regarding satisfaction with the aesthetic mitigation undertaken on UVM's property. Copies of any such verification will be provided to the DPS and the Board. Exh. PET REB 6.2 at 5.

372. Additional mitigation is provided by the buffer between Patchen Road and Centennial Woods, from the southern edge of Patchen Road through Structures #54. *Id.*

(m) General Findings Regarding Aesthetics

373. There are no locations in which the incremental upgrades from the Project would be shocking or offensive to the average person. This conclusion is based largely on the fact that the

new transmission infrastructure will be introduced to areas where existing transmission and distribution infrastructure are already included as part of the landscape. Exh. PET 9.2 at 9.

374. The Project does not violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the Project area. In fact, the utilization of existing transmission corridors is encouraged within many of the municipal plans for the communities in which the corridor exists. *Id.*

375. The Petitioners have taken generally available mitigating steps to improve the harmony of the Project with its surroundings. Reasonable mitigation has been proposed throughout the Project in structure design and also with the use of landscape mitigation plantings. *Id.* at 10.

Discussion

Section 248(b)(5) of Title 30, Vermont Statutes Annotated, requires the Board to make a finding that a proposed transmission project will not have an undue adverse effect on aesthetics, with due consideration given to the criteria for aesthetics outlined under the so-called Act 250 statute. Both the Environmental Board and the Public Service Board utilize the so-called *Quechee* decision (*Quechee Lakes Corporation*, #3EW0411-EB and #3O439-EB (1986)) to guide the aesthetics analysis. In its recent Order in Docket No. 6860, this Board explained its application of the *Quechee* test in Section 248 proceedings:

The Public Service Board has adopted the Environmental Board's *Quechee* analysis for guidance in assessing the aesthetic impacts of proposed projects under Section 248. We have previously explained the components of the *Quechee* analysis as follows:

In order to reach a determination as to whether the project will have an undue adverse effect on the aesthetics of the area, the Board employs the two-part test first outlined by the Vermont Environmental Board in *Quechee*, and further defined in numerous other decisions.

Pursuant to this procedure, first a determination must be made as to whether a project will have an adverse impact on aesthetics and the scenic and natural beauty. In order to find that it will have an adverse impact, a project must be out of character with its surroundings. Specific factors used in making this evaluation

include the nature of the project's surroundings, the compatibility of the project's design with those surroundings, the suitability of the project's colors and materials with the immediate environment, the visibility of the project, and the impact of the project on open space.

The next step in the two-part test, once a conclusion as to the adverse effect of the project has been reached, is to determine whether the adverse effect of the project is "undue." The adverse effect is considered undue when a positive finding is reached regarding any one of the following factors:

1. Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area?
2. Have the applicants failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings?
3. Does the project offend the sensibilities of the average person? Is it offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area?

Our analysis, however, does not end with the results of the *Quechee* test. Instead, our assessment of whether a particular project will have an "undue" adverse effect on aesthetics and scenic or natural beauty is "significantly informed by overall societal benefits of the project."

In re: Northwest Vt. Reliability Project, Docket No. 6860, Order of 1/28/05 at 79–80 (footnotes omitted). The Board has further explained that:

Criterion 8 of Act 250 does not guarantee that views of the landscape will not change. It does, however, require that as development does occur, reasonable consideration is given to the visual impacts on the neighboring landowners, the local community, and on the specific scenic resources of Vermont.

Id. at 140.

As this Board has noted in previous decisions concerning transmission upgrade projects, "Vermonters are accustomed to the presence of power lines, both distribution and transmission, in many locations." *Id.* at 82. In this case, the new transmission infrastructure will be introduced into areas where existing transmission and distribution infrastructure has existed as part of the landscape for several decades, and fits with the overall context of surrounding development. In several areas — and in particular along the 34.5 kV line, at the McNeil substation, and at the Williston Lay-down Area — the Project will not have any adverse impacts. In those sensitive

areas along the 115 kV corridor identified by the DPS's and Petitioners' experts, reasonable and effective mitigation has been developed through the careful planning, design, and public outreach process, which has resulted in an agreed-upon set of comprehensive design and landscape plans for the entire Project.

Based upon the applicable law and the facts presented in this case, I conclude that the Project will not result in an undue adverse effect on aesthetics, provided that the Petitioners comply with the terms and conditions set forth in the MOU entered into between Petitioners and the Department, Exhibit PET REB 9.2.

However, it is often difficult to determine the full extent of the visual impacts of a project without viewing the completed construction work. The Board has, in previous cases, retained the authority to require additional aesthetic mitigation after construction is complete², and I recommend the Board do so in this case. I note that the mitigation agreements entered into by the Petitioners with various other parties to this docket similarly permit the affected landowners to weigh in during and after construction.

H. Rare and Irreplaceable Natural Areas

[10 V.S.A. § 6086(a)(8)]

376. The Project will not have an undue adverse effect on any rare and irreplaceable natural areas. This finding is supported by findings 377 through 390, below.

377. Only one of the natural communities along the corridor between the Essex and East Avenue substations arguably qualifies as a RINA: the so-called Twin Bridges Site. Nelson/Prasch pf. at 41; Popp pf. at 5.

378. The Winooski Wetland does not constitute a RINA, although, as described in the Wetlands discussion, above, Petitioners have entered into an agreement with ANR in this proceeding to apply certain mitigation measures to address potential impacts on the functions and values of the wetland. Popp reb. at 1.

379. Centennial Woods does not qualify as a RINA, although Petitioners have developed a specific selective clearing plan to maintain the aesthetic and vegetative qualities as much as

2. See, e.g., Docket 6860, Order entered 2/19/08, at 2

possible, with the consent of UVM and consistent with VELCO's Transmission Vegetation Management Plan. *See* findings 369 through 372 above; Popp reb. at 3.

380. The Twin Bridges site is a temperate calcareous cliff/outcrop natural community located along the watercourse of the Winooski River in Colchester. The site is located approximately 100 feet above the Winooski River, with sheer cliffs and exposed ledge components. In addition to the recognized natural community, several rare and threatened plant species were identified and confirmed to be in the area. Nelson/Prasch pf. at 41–42; Nelson/Prasch pf. supp. at 8–10.

381. The existing ROW for this portion of the corridor was cleared many years ago, and the underlying geologic component of this community has remained, for the most part, unaffected by the presence of the power line corridor. Nelson/Prasch pf. at 42.

382. Petitioners have positioned proposed Structures #41 back from the top bank of the Winooski River, further away from the existing H-frame structure. *Id.*; exh. PET REB 8.1, Attachment Sheet 14A.

383. The proposed access routes to the Twin Bridges site extend from a field behind St. Michael's College through a White Pine-Red Oak-Black Oak Forest grading to a Pine-Oak Heath Sandplain Forest. Nelson/Prasch pf. supp. at 9–10.

384. Petitioners and ANR have agreed to several measures to address ANR's concerns regarding potential impacts at the Twin Bridges site. First, Petitioners plan to use a new route known as "Saint Michael's Alt # 2" to access Twin Bridges from VT Route 15 along the edge of the area known as St. Michael's field. Exh. ANR-RP-REB 1 at 5–6; exh. PET REB 7.4.

385. Second, Petitioners propose to implement, subject to landowner approval, a screening plan consisting of vegetation (with native plant species) and/or obscure signage for the proposed Saint Michael's #2 route and for the entry point immediately south of the railroad tracks. The parties recognize, based on a November 14, 2007, field visit, that there are existing pedestrian and cycling trails at the Twin Bridges area already, and that the screening plan represents a reasonable measure being taken by Petitioners to reduce pre-existing human access and the potential for future intensification of access. Exh. ANR-RP-REB 1 at 6.; exh. PET REB.6.3.

386. Third, as part of the proposed screening plan, and provided Petitioners are able to obtain the approval of Saint Michael's College, Petitioners have agreed with ANR to stump the existing large buckthorn trees at the entrance to the proposed access route, and advise the College on applying herbicides to prevent further spread of buckthorn into the forest interior. On any future vegetation maintenance visits in which the Saint Michael's Alt # 2 route is used to access the utility corridor, VELCO has agreed to use herbicides to control any buckthorn in the area affected by the screening plan. Exh. ANR-RP-REB 1 at 6.

387. Fourth, within the Saint Michael's Alt # 2 route, VELCO will replace, on a one-to-one equivalent, any trees with a diameter of 6 inches or greater with locally-grown individuals of the species already existing within the forest. *Id.*

388. Fifth, Petitioners, having spoken with the Railroad Engineering firm that owns the tracks intersecting the Twin Bridges peninsula, are evaluating the feasibility of using the railroad for access, but had not made a final determination as of the technical hearings. Special railroad equipment would be necessary to use the bridge, and the availability and cost of this equipment has yet to be determined. Petitioners have agreed to discuss this option with ANR prior to commencement of construction, and the parties having agreed that a final decision must be made based on availability of special equipment, cost, environmental impacts, and input from the construction contractor. *Id.*

389. Sixth, Petitioners have agreed to provide ANR with the exact locations and identities of all threatened and endangered ("T&E") species identified at Twin Bridges prior to construction, will reconfirm the locations of any T&E plants on the Saint Michael's Alt # 2 access route during the beginning of the growing season (i.e., as soon as practicable in late May/early June) prior to construction. Consistent with their approach in other areas with verified T&E species, Petitioners plan to use conspicuous flagging, signage, and/or barrier taping, combined with contractor training, to ensure that these species are avoided. Further, a member of the environmental team or environmental monitor will be on site during the cordoning-off of T&E plant areas and will monitor construction to ensure the construction personnel avoid the cordoned-off areas until construction has been completed and all vehicles and materials have left this highly sensitive area. *Id.*

390. Notwithstanding concerns raised by ANR personnel regarding use of herbicides at the Twin Bridges Site, no specific restrictions are proposed other than for VELCO to apply herbicides consistent with its existing permits. VELCO has agreed to continue its dialogue with ANR concerning the use of herbicides within utility corridors, with the goal of developing a uniform "best practices" methodology. *Id.*

I. Necessary Wildlife Habitat and Endangered Species

[10 V.S.A. § 6086(a)(8)(A)]

391. The Project will not destroy or significantly imperil necessary wildlife habitat or any endangered species. This finding is supported by findings 392 through 401, below.

392. No significant deer wintering habitat, moose habitat, or bear habitat has been identified within the Project corridor. The lack of significant wildlife habitat areas within the corridor is not surprising, given that the Project is located within the vicinity of the relatively densely populated area of Chittenden County, Vermont. Nelson/Prasch pf. at 44.

393. The corridor features common urban wildlife such as deer, rabbits, squirrels, raccoon, fisher, foxes, and bobcat. These species are generally well adapted to the existing conditions within the corridor, and specifically fragmented areas with tall vegetation. The dense shrubs under the power lines provide excellent cover for bobcats and cottontails in particular, resulting in an important hunting area. *Id.*; So. Burlington exh. CE-2 at 2.

394. Muddy Brook Park was identified as an area of important bird habitat, although no evidence was presented to suggest that the area represented necessary wildlife habitat, or that any endangered bird species exist within the Park. Nevertheless, Petitioners have agreed with South Burlington and WVPD to limit construction and maintenance activity, as follows: "Except as required by emergency situations, VELCO shall not use or employ mechanical clearing techniques, such as mowing and chainsawing, between May 1 and July 15, either during construction or in connection with the 2008 vegetation management cycle, on all WVPD lands." Exh. PET 12.18 at 2; Nelson/Prasch. pf. reb. at 10.

395. Petitioners have identified several rare, threatened, or endangered plant species in and outside of the Project corridor. Exh. PET 10.5 app. 3; exh. PET REB 8.1 Attachment (Memorandum dated Nov. 16, 2007).

396. Petitioners have received easements for all but a handful of construction access routes, and expect to obtain the remaining easements by late May of 2008. With the exception of the follow-up surveys required for S. D. Ireland Alt #2 and Saint Michael's Alt #2 (discussed below), all of the proposed access routes have been surveyed for RTE species. Exh. EAL B (Response to PSB Staff Memo) at 6; Nelson/Prasch pf. supp. at 8–9;

397. Several species of rare plants were identified in surveys completed in the Fall of 2006 and Spring/Summer 2007. Only four species qualifying as "threatened" pursuant to 10 V.S.A. Chapter 123 were identified: harsh sunflower; great St. Johnswort; low bind-weed; and slender mountain-rice. No "endangered" plant species have been identified within the corridor or along the proposed access routes. All identified RTE plant species will be avoided by construction activities. Exh. PET 10.5 app. 3; finding 389, above.

398. The two areas with the greatest concentrations of RTE species are the Twin Bridges site and the area near the Green Mountain Power Gorge substation. Centennial Woods, Gorge ("Caitlin") Island, and the Gorge Road #2 Off-ROW Access Route are locations with more isolated occurrences of RTE species. *Id.*; Nelson/Prasch. pf. at 47–48; Nelson/Prasch pf. reb. at 8–9; exh. PET REB 8.1 at 3.

399. As previously discussed in the RINA section, ANR and Petitioners have agreed on a protocol with respect to RTE species at Twin Bridges. Exh. ANR-RP-REB 1 at 6.

400. The Route 2A Lay-down Area will be evaluated for the presence of RTE species in the spring and summer of 2008, prior to construction activities. Exh. ANR-RP-REB 1 at 4–5 and n.2.

401. Petitioners plan to use conspicuous flagging and/or barrier taping for any identified RTE species in the Project corridor or access prior to undertaking any construction activities. Nelson/Prasch. pf. reb. at 9.

J. Historic Sites

[10 V.S.A. § 6086(a)(8)]

402. The proposed Project will not have an undue adverse effect on historic resources. This finding is supported by findings 403 through 422, below.

(1) Archeological Resources

403. The Agency of Commerce and Community Development Division for Historic Preservation ("DHP") and the State Historic Preservation Officer ("SHPO") have the responsibility to determine, under state law and Section 106 of the National Historic Preservation Act (the "Federal Act"), whether the Project will have adverse effects on historic sites listed or that are eligible for listing on the State or National Register of Historic Places. Exh. DHP-2 at 2.

404. VELCO, DHP, and SHPO have signed a Memorandum of Agreement, dated as of the 16th day of October, 2007 (the "MOA"), to formalize a collaborative process for determining the work VELCO must perform — in accordance with the DHP's Guidelines for Conducting Archaeology in Vermont, dated July 2002 (the "DHP Guidelines"), the Federal Act and the Secretary of the Interior's Standards and Guidelines for Archaeological Determinations — to identify and evaluate archaeological resources that may be adversely affected by the Project, avoid or mitigate adverse effects on any such resources found, and submit consensus testimony and reports thereon to the Board. *Id.*

405. The MOA requires the parties to agree on and then VELCO to retain an independent archaeologist to serve as the "DHP Archaeologist" for the Project, and the parties have agreed and VELCO has retained Stuart A. Eldridge to serve as the DHP Archaeologist. *Id.* at 3; Eldridge pf. at 2.

406. Before execution and implementation of the MOA, VELCO retained The Louis Berger Group, Inc. ("Louis Berger"), to prepare an Archaeological Resource Assessment ("ARA") and Scope of Work ("SOW"). Exh. PET 15.2.1 at 1.

407. The purpose of the ARA was to identify archaeologically sensitive areas that could be adversely affected by the Project. *Id.*

408. The purpose of the SOW was to describe the "Phase I" work that should be performed to identify archaeological resources that may be located in the ARA-described sensitive areas affected by the Project. Exh. DHP-2 at 3.

409. The MOA required the DHP Archaeologist to review the ARA and SOW, evaluate whether the work described in the SOW should have been done differently or additional work should have been performed, work with VELCO to reach agreement on the Phase I SOW, including any additional Phase I testing that the DHP Archaeologist believes should be performed, and then submit, on behalf of the MOA parties, consensus testimony as to the Phase I SOW. Eldridge pf. at 3.

410. The ARA, which was reviewed by the DHP Archaeologist, identified all of the archaeologically sensitive areas that could be adversely affected by the Project. *Id.* at 9; *see* exh. 15.2.1 (rev.) & 15.2.2 (rev.).

411. The DHP Archaeologist reviewed the SOW as well as information provided by Louis Berger as to its actual performance of Phase I work in the field. Eldridge pf. at 5–6.

412. Following this review, the DHP Archaeologist identified archaeologically sensitive areas for which Louis Berger demonstrated satisfactory performance of Phase I work under the DHP Guidelines but recommended that VELCO perform — and VELCO has agreed to perform — additional "Phase I Shovel Testing" in two areas as well as "Deep Testing" at the location of 30 structures. *Id.*

413. In consultation with the DHP Archaeologist, the agreed Deep Testing will require VELCO's archaeological consultant to excavate a one meter-by-one meter test unit in the area of specified structure sites to a depth of approximately four to five feet below the contemporary surface (at which depth OSHA regulations require stepping and shoring of test-unit walls). *Id.* at 8.

414. If flooding occurs before the test unit is completed, the consultant must confer with the DHP Archaeologist as to the efficacy of proceeding. *Id.*

415. Upon completion of the excavation, the consultant must clean, photograph and describe, in terms of morphological and depositional characteristics, the profile of each wall of the test unit. *Id.*

416. Before exiting the unit, the consultant must use a bucket auger to take a soil-core sample that extends below the base of the test unit until "refusal" (or until the maximum practical extension of the coring tool), and the consultant must then describe the soil and depositional characteristics of the sample taken. *Id.*

417. The purpose of the Deep Testing is to ensure that, before a transmission-line structure is emplaced, VELCO's consultant will have evaluated, in consultation with the DHP Archaeologist, whether the structure could have an adverse effect on a cultural resource. *Id.*

418. If Deep Testing discloses the existence of cultural resources or an intact former land or soil surface that should be tested further for such resources, VELCO's consultant will take additional measures, in consultation with the DHP Archaeologist — which could include reasonable expansion of the test unit — either to determine that the structure will not have such an adverse effect on any cultural resources or to minimize ground disturbance when the structure is emplaced. *Id.*

419. The MOA will also require the DHP Archaeologist to: review any SOWs developed for Phase II evaluation or Phase III mitigation work; work with VELCO to reach consensus on such SOWs; recommend that the SHPO concur in such SOWs; conduct field verification to confirm or modify and monitor performance in the field of the SOWs for such Phase II evaluation or Phase III mitigation; approve certain SOW changes in the field warranted by field conditions encountered during the Project's construction; and review end-of-field letters and management summaries prepared by VELCO's consultant, on VELCO's behalf, documenting performance of all archaeological work and make a recommendation of concurrence thereon to the SHPO. *Id.*

420. The MOA establishes a dispute-resolution procedure between the parties. *Id.* at 7.

421. If the parties are not able to reach agreement on disputes, the MOA provides for resolution of such disputes by the Board through an informal process (unless the Board determines that a more formal proceeding is required). *Id.* at 7.

422. If VELCO satisfactorily performs the additional work recommended by the DHP Archaeologist as well as appropriate Phase II site-evaluation studies and Phase III data-recovery investigations, which under the MOA will be reviewed by the DHP Archaeologist and concurred

with by the SHPO both as to the proposed SOW and the work actually performed, the Project will not have an undue adverse effect on any archaeological historic sites. *Id.* at 9–10; *see* exh. DHP-2 at 3.

Discussion

For previous transmission projects, VELCO submitted an ARA that identified archaeologically sensitive areas. To make the required Section 248 finding of no undue adverse impact on archaeological historic sites, the Board would condition the CPG issued for the project, among other requirements, to prevent VELCO from undertaking any site preparation or construction activity in an archaeologically-sensitive area identified in the ARA without DHP's review and approval.

This Project is somewhat unusual in that VELCO already has access to the project's right-of-way and access roads and accordingly has begun work to identify the potential for archaeological sites to be adversely affected by the Project. However (and similar to previous transmission projects), to comply with the DHP Guidelines VELCO must still undertake additional, post-CPG work to identify and evaluate the potential for such adverse effects from the Project, and for any sites found consideration will be given to avoid the site, minimize the impact, or perform appropriate Phase III mitigation (data recovery). The purpose of the MOA is to establish a consultative process for undertaking this work — one under which the DHP Archaeologist will consult with VELCO regarding the work to be undertaken and make certain decisions upon request while fieldwork is ongoing — so that before construction begins in the archaeologically sensitive areas identified in the ARA, necessary site-evaluation and mitigation work will have occurred to ensure that there will be no undue adverse effect on identified archaeological sites.

The MOA thus presents a different procedural approach to addressing the Section 248 criterion protecting historic sites — one that has already led to the submission of consensus testimony on the ARA and the Phase I work performed and to be performed — and establishes a procedure for resolving disputes between the parties and, if necessary, by the Board. As such, in

lieu of imposing other Project-specific conditions, I recommend that the Board approve the MOA and condition the CPG to require VELCO to comply with it.³

(2) Above-Ground Historic Resources

423. In order to determine adverse and undue effects on historic properties, it is first necessary to identify those historic properties within the affected viewshed. Historic properties are generally defined as "buildings or structures being at least fifty years of age and retaining original or historic architectural or structural integrity." Henry/Buscher pf. at 4.

424. Petitioners identified a number of historic properties within the affected viewshed of the Project. Each historic property was identified, described, and assessed for effect by the proposed transmission lines and substation expansion. *Id.*; exh. PET 13.2 (Historic Sites Report).

425. During the course of their investigations, Petitioners discovered some cases where elements of the proposed Project will have effects on historic properties that warrant mitigation. In most cases, the recommendations involve vegetative plantings to provide additional screening of the views from the historic properties of the proposed transmission lines or substation. Henry/Buscher pf. at 5–6; exh. PET 9.2.

426. The East Avenue Loop Project will not cause undue adverse effects on historic properties, provided that Petitioners follow the mitigation measures in certain cases as discussed in the Historic Sites Report. Exh. PET 13.2.

Discussion

Criterion 8 of Act 250 sets forth a three-part analysis for evaluating the potential effects of a project upon historic sites: "(a) whether the Project site is or contains an historic site; (b) whether the Project will have an adverse effect on the historic site; and (c) whether any such

3. The MOA has a termination clause, and the Board should require VELCO to provide advance notice of the MOA's termination so that, if necessary, the Board can convene a status conference to evaluate the work that has been performed to protect archaeological resources up to such termination and what different conditions should be imposed upon such termination to ensure that the Project will not have an undue adverse effect on archaeological historic sites.

adverse effect will be undue." *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at 170.

The following standards are employed to determine whether a project has an adverse and undue impact under Criterion 8:

[i]n evaluating adverse effect on a site, it is central to determine whether a proposed project is in harmony or fits with the historic context of the site. Important guidelines in evaluating this fit include: (1) whether there will be physical destruction, damage, or alteration of those qualities which make the site historic, such as an existing structure, landscape, or setting; and (2) whether the proposed project will have other effects on the historic structure, landscape, or setting which are incongruous or incompatible with the site's historic qualities, including, but not limited to, such effects as isolation of an historic structure from its historic setting, new property uses, or new visual, audible or atmospheric elements. The 'undue' quality of an effect on an historic site can be judged in several different ways. A positive conclusion on any one of the following guidelines can lead to a determination that an adverse effect is undue:

- a. The failure of an applicant to take generally available mitigating steps which a reasonable person would take to preserve the character of the historic site.
- b. Interference on the part of the proposed project with the ability of the public to interpret or appreciate the historic qualities of the site.
- c. Cumulative effects on the historic qualities of the site by the various components of a proposed project which, when taken together, are so significant that they create an unacceptable impact.
- d. Violation of a clear, written community standard which is intended to preserve the historic qualities of the site.

Id.

Based upon the evidence presented, I conclude that the Project will not have an undue adverse effect upon above-ground historic properties.

K. Primary Agricultural and Forest Soils

[10 V.S.A. § 6086(a)(9)(B)& (C)]

427. The Project will not result in the degradation or loss of agricultural or forest soils. This finding is supported by findings 428 through 430, below.

428. There is only one area where ongoing agricultural activities are being conducted beneath the corridor. This area is south of River Cove Road in Williston and South Burlington. Cropped fields and pasture are located beneath the existing 115 kV line, but it does not appear that the presence of the corridor has any significant effect on the ability to continue agricultural production within these areas. Prash/Nelson at 50–51.

429. The substation expansions are proposed for areas within existing developed footprints, and only minimal temporary impacts to agricultural soils will be associated with access for construction of the Project. Accordingly, there will be no undue adverse effect on soils mapped by the NRCS to be Prime Agricultural Soils or Soils of Statewide Importance. *Id.* at 50.

430. No active logging was noted along the corridor, as expected given its location within a primarily urban setting. As discussed in the findings on vegetation management, only minor additional clearing is expected with the 115 kV line right-of-way, and as such there will be insignificant impacts on forest soils and potential forest production. *Id.* at 51.

L. Development Affecting Public Investments

[10 V.S.A. § 6086(a)(9)(K)]

431. The Project will not materially jeopardize or interfere with the function, efficiency, safety, or the public's use, access to, or enjoyment of public resources, facilities, services, or lands. This finding is supported by findings 432 through 441, below.

432. The public investments and public facilities affected by the Project include electric transmission and generation facilities, transportation infrastructure, hospitals and educational institutions, business districts, major water bodies, and several public lands. Findings 10–12, above.

433. Electric transmission facilities will be positively affected by the Project, and the Project will not result in an undue adverse effect on system stability and reliability. *See* findings 162 through 164, above.

434. With respect to office buildings, universities, first responders, schools and hospitals in the affected municipalities, the Project will not negatively affect these public institutions. The purpose of the Project is to provide greater reliability of the Chittenden County electrical grid precisely to avoid jeopardy to the continued operation of the Fletcher Allen Health Care ("FAHC"), the University of Vermont, and the numerous other public, commercial, and residential users of electricity in the Greater Burlington area. The letters from FAHC and the various business groups in support of the Project, as well as the City of Burlington's resolution, provide evidence in support of this statement. *Stamatov* pf. at 15; exh. PET 12.17.

435. With respect to the Winooski River, the most important portion of that resource to protect vis-à-vis the Project is the Winooski Wetland, as well as the shorelines of the river itself. Measures being taken by Petitioners to protect these areas are discussed in findings 245–266 (wetlands) and 228–243 (shorelines).

436. With respect to the Lake Champlain Waterfront, the removal of portions of the Lake Street substation and BED lines will positively affect the aesthetics of the Waterfront. Specifically, the relocation of BED's Lake Street transformer to McNeil will result in removal of several of BED's aerial distribution circuits along the waterfront, and will set the stage for Green Mountain Power to remove its Waterfront 34.5 kV lines. *Kasti* pf. at 14–15.

437. Upon completion of this Project, BED will also remove, place underground, or relocate its remaining Waterfront distribution lines from Lake Street substation to Maple Street as part of BED's Waterfront project. *Id.* at 13.

438. Finally, there are three public lands affected by the Project that should be considered for the Criterion 9(K) analysis: the WVPD lands, Centennial Woods, and the Country Club Estates park area. *Stamatov* pf. at 15–17.

439. Concerning WVPD lands, Petitioners, South Burlington, and the WVPD have reached agreement on six conditions designed to avoid unnecessarily or unreasonably

endangering or interfering with the function, efficiency, or safety of, the public's use or enjoyment:

1. The proposed construction limits within any affected WVPD parks shall be fenced off with construction fencing prior to commencement of any construction or related activity within the park. These limits shall be depicted on the orthophotos attached to VELCO's Erosion and Sediment Control Plan, to be submitted for approval to the Vermont Agency of Natural Resources (ANR). Subject to any modifications or revisions required by ANR, said proposed and approved orthophotos shall be attached hereto and incorporated herein by reference as Exhibit A to the MOU. Any WVPD property damaged by VELCO shall be promptly restored to a condition that is, in WVPD's judgment, equal or superior to the conditions that existed prior to commencement of the EAL Project.
2. Prior to the commencement of VELCO's 2008 vegetation management cycle, VELCO shall notify WVPD of the proposed date on which VELCO will flag the danger trees to be removed from WVPD lands. Following the flagging of danger trees, VELCO shall deliver to WVPD an orthophoto, in a form substantially similar to the Centennial Woods aerial map attached as Appendix C to Exhibit PET 9.2, marking the danger trees to be removed as a result of the 2008 clearing cycle and the Project.
3. There will be no stockpiling of materials, storage of construction equipment, or parking of construction employee vehicles on WVPD lands. Construction machinery and equipment may remain on WVPD lands for periods required to complete construction of the new infrastructure associated with the Project, and removal of any temporary or obsolete infrastructure proposed for those lands.
4. Unless otherwise agreed by VELCO and WVPD, a seed mix pre-approved by the WVPD shall be used on disturbed areas that are not to be landscaped.
5. Pedestrian access shall be maintained on an on-going basis from the Muddy Brook parking lot to unobstructed trails leading to the river, and the Contractor/VELCO shall post signs to direct park visitors to open river access routes while construction is in progress.
6. Except as required by emergency situations, VELCO shall not use or employ mechanical clearing techniques, such as mowing and chainsawing, between May 1 and July 15, either during construction or in connection with the 2008 vegetation management cycle, on all WVPD lands.

Exh. PET 12.18.

440. Furthermore, as discussed in these findings regarding aesthetics, Petitioners, South Burlington, and the WVPD have agreed on landscaping plans and a condition limiting clearing between the utility corridor and the Valley Ridge neighborhood. Exh. 12.18 at 2–3.

441. The use and enjoyment of Centennial Woods will be protected by a combination of the selective clearing plan set forth in Petitioners' visual report, the commitment to cordon off and flag RTE species prior to construction, and the aesthetic mitigation measures agreed upon between VELCO and UVM. See findings 369 through 372, above.

Discussion

In construing whether the Project will negatively impact public investments, the Board employs the test set forth by the Environmental Board in *Swain Development Corporation*, No. 3W 0445-2-EB at 33 (Environmental Board, August 10, 1990), as follows:

The Board interprets Criterion 9(K) to call for two separate inquiries with respect to public facilities. First, the Board is to examine whether a proposed project will unnecessarily or unreasonably endanger the public investment in such facilities. Second, the Board is to examine whether a proposed project will materially jeopardize or interfere with (a) the function, efficiency or safety of such facilities, or (b) the public's use or enjoyment of or access to such facilities.

Under the first prong of this test, the Board determines "whether the proposed Project will physically damage the public investment itself." *In re: Northwest Vt. Reliability Project*, Docket 6860, Order of 1/28/05 at 165. The new 115 kV line is to be installed within an existing transmission corridor and existing cleared right-of-way. The installation of the second line and the new structures within the existing corridor will not jeopardize any public investment within or adjacent to the corridor.

The second prong of the test examines whether the proposed Project will "materially jeopardize or interfere with (a) the function, efficiency or safety of such facilities, or (b) the public's use or enjoyment of or access to such facilities." *Id.* The only potential impacts that the proposed Project will have on conserved and protected lands are aesthetic impacts and temporary impacts on public access during construction.

For the reasons stated in the "Aesthetics" discussion, the proposed Project will not have an undue adverse impact upon aesthetics or scenic beauty, provided that Petitioners observe the conditions of this Order regarding aesthetics and natural resources, as well as the various agreements Petitioners entered into with the Department, the WVPD, South Burlington, and UVM. As for potential impacts on public access, the findings above demonstrate that such impacts should be minimal. Consequently, the proposed Project, so modified and conditioned, will not materially interfere with the public's use or enjoyment of these public lands and resources.

M. Electromagnetic Fields (EMF)

442. The electric and magnetic fields ("EMF") produced by the proposed Project will not have an undue adverse effect on the public health or safety. This finding is supported by findings 443 through 459, below. *See also In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at 62–78.

443. All matter contains electrically-charged particles. Each electric charge generates an electric field that exerts force on other nearby charges. The electric field is a measure of force per unit-charge and is usually expressed in units of volts per meter (V/m). Valberg pf. at 5–6.

444. When electric charges move, an electric current exists, and the current generates a magnetic field. *Id.* at 6.

445. Everyone is exposed to a wide variety of natural and man-made electric and magnetic fields. *Id.* at 7.

446. Man-made magnetic fields are common in everyday life. Many childhood toys contain magnets. "Permanent magnets" generate strong, steady magnetic fields. Typical toy magnets (e.g., "refrigerator-door" magnets) produce 100,000 – 500,000 mG. *Id.*

447. The earth's atmosphere produces slowly varying electric fields (about 100 to 10,000 V/m) that occasionally discharge dramatically, as lightning strikes. Also, magnetic fields are produced by the earth's core, and can be easily demonstrated with a compass needle. The strength of the earth's magnetic field in the Northeast U.S. is about 570 mG. *Id.* at 8.

448. Electric power transmission lines, distribution lines, and the electric wiring in buildings carry AC currents and voltages that alternate size and direction at a frequency of 60 Hz. These 60 Hz currents and voltages produce 60 Hz EMF. The size of the magnetic field is proportional to the current, and the size of the electric field is proportional to the voltage. *Id.*

449. The earth's steady EMF do not have the 60-cycles-per-second (60 Hz) time variation characteristic of power-line EMF, but are otherwise indistinguishable from power-line EMF. For example, a magnet spinning at 60 cycles per second will produce a magnetic field indistinguishable from the magnetic fields produced by an appropriate magnitude of 60 Hz power-line current. *Id.*

450. The EMF produced by transmission lines, electrical wires, and electrical equipment decrease rapidly as the distance away from the source increases. *Id.*

451. Inside residences, typical baseline 60 Hz magnetic fields (not near appliances) range from 0.5 to 2.0 mG. EMF inside the home arise from electric appliances, outdoor distribution wiring, indoor wiring, and grounding currents. *Id.* at 8–9.

452. Higher magnetic field levels are found near operating appliances. For example, can openers, mixers, blenders, refrigerators, fluorescent lamps, electric ranges, clothes washers, toasters, portable heaters, vacuum cleaners, electric tools, and many other appliances produce magnetic fields ranging from 40 to 300 mG at distances of one foot.⁴ Magnetic fields from personal-care appliances held within one-half foot (e.g., shavers, hair dryers, massagers) can produce 600–700 mG. In the school and work environment, copy machines, vending machines, video-display terminals, electric tools, lights, and motors are all sources of significant power-line magnetic fields. *Id.* at 9.

453. Evidence available from scientific research on EMF and from human experience with EMF exposures does not establish that typical levels of power-line EMF are hazardous to health. *Id.* at 10.

4. National Institute of Environmental Health Sciences, Electric and Magnetic Fields Associated with the Use of Electric Power, Questions and Answers, NIH Publication No. 02-4493 (2002), Research Triangle Park, NC, available at <http://www.niehs.nih.gov/emfrapid/booklet/home.htm>.

454. Thousands of studies have now examined the hypothesis that power-line EMF exposure can lead to biological effects and, potentially, adverse health impacts. Out of this vast number, some studies have reported results that could be interpreted as suggestive of power-line EMF being hazardous to human health. However, it has not been possible to determine if these results truly reflect a consistent and causal role for EMF in the health endpoints studied, or whether they represent statistical fluctuations or non-causal factors, such as might be expected in any series of observed correlations. *Id.* at 32.

455. Some of the most important work was done under the auspices of the National Institute of Environmental Health Sciences ("NIEHS"). NIEHS had a program called "EMF RAPID" that funded laboratory research to determine what, if any, aspects of EMF interaction with biological systems had the potential to express themselves as adverse disease outcomes. The conclusion of this research program is summarized by NIEHS as follows:

The NIEHS believes that the probability that ELF-EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal, scientific support that exposure to this agent is causing any degree of harm.

Id. at 12–13, quoting p. 52 of the June 2002 NIEHS booklet "EMF Questions and Answers".

456. In spite of many years of diligent work, no firm evidence of adverse EMF effects has been found in the laboratory for any of these measures of EMF exposure. *Id.* at 18.

457. At this point in time, a large volume of research and analysis on the question of EMF health effects has been generated, representing the accumulation of many years of laboratory work and many years of human experience with EMF. The scientific data on EMF and health have been assembled and reviewed by many independent scientific consensus groups of research and public-health experts. These groups and agencies include the World Health Organization, the National Radiation Protection Board (UK), the National Academy of Sciences, the American Medical Association, the American Physical Society (the professional society for American physicists), the American Cancer Society, the Swedish National Health and Welfare Board, and others. These "blue-ribbon" panels do not conclude that EMFs from electric-power transmission lines are unsafe for nearby residents and the public. The reports of these groups are voluminous, thorough, and even-handed. *Id.* at 18–19.

458. The U.S. has no federal standards limiting occupational or residential exposure to 60 Hz EMF, nor does Vermont. *Id.* at 24–25.

459. In comparison to international, national, and state standards and guidelines that exist, the calculated EMF levels (both the maximum levels and at the ROW edge) for the Project are considerably below what is permissible within the guidelines for public locations. Moreover, in terms of the magnetic fields (the component of EMF that has been subject to the greatest scrutiny), the maximum levels caused by the Project will be quite modest. *Id.* at 31.

Discussion

The Board has previously found that:

the electric and magnetic fields ("EMF") that will result from the proposed Project are very unlikely to have an undue adverse effect on public health. It is not possible to state unequivocally that there will be no adverse health effects. Some epidemiological studies have found a weak correlation between EMF and childhood leukemia, despite the fact that no mechanism of causation has been found.⁵

The Board specifically declined to set standards for EMF exposure or adopt the guidelines established by other states, and instead adopted a policy of prudent avoidance. The Board identified several definitions of prudent avoidance, including the following:

[A]doption of policies that limit magnetic field exposure whenever this can be done for a small investment of money and effort. Prudent avoidance argues that a sufficient basis for concern does exist but not enough is presently known to justify large investments for avoiding magnetic field exposure. Under this approach, large expenditures would not be made until research provides a clearer picture of the existence and magnitude of the risks involved.⁶

The Board further examined what would constitute low-cost investment with respect to prudent avoidance and found some general guidance from a decision by the California Public Utilities Commission. In response to the scientific uncertainty surrounding EMF, the California

5. Docket 6860, Order of 1/28/05 at 62.

6. Docket 6860, Order of 1/28/05 at 74 citing the Department's 1994 Twenty-Year Electric Plan at 5–12.

Public Utilities Commission required utilities to undertake low-cost mitigation measures. The California Commission defined "low-cost" as:

in the range of 4% of the total project cost but specified that this 4% benchmark is not an absolute cap. [The Commission] found that, to be implemented, a mitigation measure should achieve some noticeable reduction in EMF but declined to adopt a specific goal for EMF reduction.⁷

The Colorado Public Utilities Commission, in a recent order, describes mitigation techniques such as increasing line clearance and careful line configuration as falling within the parameters of prudent avoidance.

As the Board found in Docket 6860, the National Institute of Environmental Health Sciences does provide some specific guidance as to recommended regulatory action in response to current knowledge of EMF risk:

The NIEHS suggest that the level and strength of evidence supporting . . . EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory actions; thus, we do not recommend actions such as stringent standards on electric appliances and a national program to bury all transmission and distribution lines. Instead, the evidence suggests passive measures such as continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. NIEHS suggests that the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards.⁸

The Project passes by very few residences and no party has asked that any portion be placed underground.

N. Transmission Vegetation Management

460. Generally, the Project will not require widening or additional clearing of the existing corridor. The only clearing necessary will be: (i) for areas where VELCO proposes to swap its existing ROW for new ROW on the same property; and (ii) for a very small portion of the area of Centennial Woods between Structures N/S 58 and the East Avenue substation.

7. 236 P.U.R. 4th 406 (Cal. P.U.C., August 19, 2004).

8. Docket 6860, Order of 1/28/05 at 75 (citing exh. VELCO Cross DelPizzo-8 at 37–38).

Neither of these areas have been identified by Pioneer Environmental Associates or ANR as areas of environmental sensitivity. Disorda reb. pf. at 2; Exh. PET 8.1.1, Sheets 1, 2, and 7.

461. There will also be some minor clearing in connection with certain construction access routes, including Saint Michael's Alt. #2, Gorge Road #2, and S. D. Ireland Alt. #2. Disorda reb. pf. at 2–3; exhs. PET REB 7.4, 7.5, and 7.6.

462. Clearing of the Project corridor is a planned maintenance activity that will occur independent of the proposed Project, pursuant to VELCO's Transmission Vegetation Management Plan ("TVMP"). Disorda reb. pf. at 3.

463. VELCO currently manages the corridor to its full 150-foot cleared width; however, some tree encroachments have occurred at the edge of the corridor over time and these will be addressed (removed) during the next regular clearing cycle in order to meet the required vegetation-conductor clearances in the TVMP. *Id.*

464. Trees at the edge of and outside the corridor will be evaluated and removed as necessary if they are deemed to pose a threat to the line because of species, growth pattern, height, ledge, soil conditions, erosion, or other location conditions, disease, and other defects. Disorda pf. at 6; exh. PET 11.4.

465. The last vegetation management cycle for the Project corridor occurred in 2004; the next regularly scheduled management cycle is in 2008, and will occur regardless of the status of the Project. Disorda reb. pf. at 3.

466. Generally, Project construction will not require more extensive tree clearing than would otherwise occur during the 2008 clearing cycle. However, there are two exceptions: (1) clearing for new access locations and wire-pulling locations; and (2) to account for danger trees due to the line-design changes and the increased proximity to the right-of-way. More trees will need to be evaluated, and possibly removed as danger trees, as shorter trees may be considered to be danger trees as the line is moved closer to the edge of the right-of-way. Disorda pf. at 7.

467. As a bulk transmission system operator, VELCO's tree-clearing and vegetation-management practices are designed to conform to the Transmission Vegetation Management Program reliability standards recently adopted by the North American Electric Reliability Corporation ("NERC") as Standard FAC-003-1, and to the American National Standards Institute

("ANSI") Standard A300 — Standard Practices for Tree Shrub and Other Woody Plant Maintenance (Integrated Vegetation Management — Electric Utility Rights-of-Way). Disorda pf. at 2.

468. The NERC standard was adopted after the blackout of August 14, 2003; one of the initiating events of the blackout was a line outage caused by a contact between a transmission line and vegetation below the line. Disorda pf. at 3; exh. PET 11.2.

469. The ANSI standard is considered by NERC to be an industry best practice. The ANSI standard calls for Integrated Vegetation Management ("IVM") designed to promote sustainable plant communities that are compatible with the intended use of the utility corridor, and discourage incompatible plants that may pose concerns, including safety, security, access, fire hazard, electric service reliability, emergency restoration, and other requirements. Disorda pf. at 3, 5; exh. PET 11.3 § 70.2.

470. ISO-NE has also developed Operating Procedure ("OP") 3, the stated objective of which is to "achieve and maintain a high degree of reliability for the New England Transmission System." Exh. PET REB 9.8 at 1; Disorda reb. pf. at 14.

471. The ISO-NE OP3 Standard applies to transmission voltages of 69 kV and above, and therefore will apply to the East Avenue Loop's Essex to East Avenue ROW. Disorda reb. pf. at 14; *see generally* exh. PET REB 9.8.

472. Vegetation-conductor clearances are a significant reliability concern because failure to maintain proper clearances presents a serious risk to the safety and reliability of the Vermont and interconnected regional and national electric grid. Contact between vegetation and conductors can result in sustained transmission-system outages and could directly contribute to power-system instability, separations, or a cascading sequence of failures. Disorda reb. pf. at 6.

473. VELCO's TVMP, effective June 1, 2007, was developed to comply with newer and stricter vegetation management policies and practices established by NERC and ISO-NE. Disorda reb. pf. at 3; exh. PET REB 9.1.

474. The goal of VELCO's TVMP is to prevent physical contact between transmission lines and nearby vegetation that could cause a transmission line to fail. Disorda reb. pf. at 14–15.

475. VELCO utilizes a system of vegetation management that manages plant communities in which compatible and incompatible vegetation are identified, action thresholds are considered, control methods are evaluated, and selected control(s) are implemented. Disorda reb. pf. at 15.

476. Choice of control methods is based on safety, environmental impact, effectiveness, site characteristics, security, and economics. This is the IVM system of vegetation management, as recommended in the ANSI Standard. Disorda reb. pf. at 15; *see* exh. PET 11.3.

477. VELCO has established a four-year vegetation management cycle as an action threshold. This vegetation management cycle has been time tested since 1980, and is based upon the engineering design of the lines, the growth-rate potential of the vegetation, and required minimum vegetation-to-conductor clearances. Disorda pf. at 5.

478. As recommended by FERC, VELCO has established a wire zone-border zone approach to vegetation management. The wire zone is the area under the conductors and extends to 15 feet beyond the outside conductor. Disorda reb. pf. at 9, 16.

479. All tall-growing, incompatible species are eliminated in both the wire zone and the border zone. These incompatible species are identified in the TVMP. The TVMP also identifies lower growing, compatible trees and shrubs that may be allowed to remain in the corridor. The TVMP breaks down compatible tree species into these categories: compatible species allowed within the wire zone, and compatible species allowed within the border zone. *Id.* at 16.

480. The type of compatible vegetation permitted within the border zone includes vegetation that does not normally mature to greater than 12 feet tall, but could exceed 12 feet in height. Any trees that grow taller than 12 feet within the border zone are removed on the next cycle. *Id.*

481. Vegetation allowed within the wire zone does not mature to greater than 12 feet. Over time, the plant community (trees, shrubs, forbs, ferns, and grasses) retained within the ROWs stabilizes into a very low-maintenance condition of compatible species. This low-growing plant community in the ROW has been found to promote and sustain wildlife habitat within those ROWs. *Id.* at 16–17.

482. In the area of Muddy Brook Park, VELCO has agreed to limit mechanical clearing techniques such as mowing during the months of May and June to avoid nesting birds. *Id.* at 5.

O. Consistency with Resource Selection

Integrated Resource Plan

[30 V.S.A. § 248(b)(6)]

483. The Project is consistent with the principles for resource selection expressed in the Integrated Resource Plans ("IRP") of both Green Mountain Power and BED. *See* findings 484 through 496, below.

484. Green Mountain Power's 2003 IRP calls for Green Mountain Power to address capacity-related constraints through transmission improvements consistent with Distributed Utility Planning ("DUP") guidelines. Cecchini pf. at 11; exh. PET 3.2.

485. The Project addresses the 34.5 kV system constraints on the Green Mountain Power system, and was subject to the Area Specific Collaborative process to insure consistency with DUP planning guidelines. Cecchini pf. at 11; exh. PET 3.2 at 82–83.

486. BED's IRP provides that BED has undertaken a joint effort with GMP and VELCO to address the bulk transmission system reliability concerns (pp. 1–9). Section 4, Pages 4–7 through 4–8, discusses BED's reliability concerns, provides justifications for improving the transmission system supplying BED, and discusses BED's reliability projects including the East Avenue Loop project. Kasti pf. at 15; exh. PET 2.6.

487. The Project is consistent with the principles of least-cost planning, because it cannot be cost-effectively supplanted or deferred by demand-side management, generation, or load response. *See* findings 138 through 161, above.

488. Consistent with the Board's Order approving BED's IRP, BED will analyze and implement all cost-effective capacitor installation, circuit-balancing, and phase-balancing opportunities arising from relocating its Lake Street substation to the McNeil substation site. Kasti pf. at 16.

489. Although VELCO has not been required to have an IRP, it is required to plan its transmission system in accordance with the June 20, 2007, Board-approved Docket No. 7081

Memorandum of Understanding ("7081 MOU"). The 7081 MOU sets forth a process that facilitates least-cost integrated resource planning for Vermont's transmission system.

Investigation into Least-Cost Integrated Resource Planning for Vermont Electric Power Company, Inc.'s Transmission Plan, Docket No. 7081, Order of 6/20/07 at 3.

490. In order to allow for transition into the 7081 MOU planning process, Paragraph 102 of the MOU specifies that for certain projects that are the subject of ongoing area-specific collaboratives ("ASC"), including the East Avenue Loop Phase I Project (designated as the "City of Burlington Waterfront" ASC in the MOU), the only provisions of the MOU that shall apply are Steps 1, 2, 4 through 6, 10, and paragraph 66. Nolan pf. at 10–11; exh. PET 5.6 (7081 MOU ¶ 102).

491. The net effect is that the Project must be incorporated into VELCO's Long-Range Transmission Plan and planning efforts, but is exempt from the public engagement and non-transmission alternatives ("NTA") analysis provisions of the 7081 MOU. Nolan pf. at 11.

492. This exemption in the 7081 MOU is a recognition of the large amount of NTA and public outreach work already associated with the Project prior to the MOU. In addition, the process for the Project has met the spirit of many of the objectives of the MOU. See *id.*; findings 493 through 496, below.

493. For example, BED's aggressive demand-side management ("DSM") in the 1990s helped to delay the Project for more than a decade. Moreover, the Petitioners consciously divided the original East Avenue Loop Project into three phases because some of the elements are not needed now and possibly could be deferred. Only construction of Phase I is being pursued at this time, while Phases II and III were identified many years before they are required. Phase II is already listed as a targeting location for incremental DSM funds. Nolan pf. at 11, 12.

494. NTA analyses have been ongoing since 2000, in tandem with refinements to the transmission solution. At each step, as the transmission-solution impacts changed, or cost estimates were updated, the NTA work was reviewed and updated to determine if course corrections were required. As noted, the analysis also resulted in the phasing of the Project. *Id.* at 12.

495. The underlying studies have also helped clarify the benefits the Project brings to each party, and have allowed BED and GMP to reach a mutually acceptable cost-allocation agreement that is signed and in place prior to implementation of the Project. *Id.*; exh. PET 2.5.

496. The Petitioners' actions were consistent with the spirit of the Docket 7081 MOU public participation provisions by hosting extensive stakeholder meetings. *See* findings 86 through 90, *supra*; Nolan pf. at 13.

Discussion

Section 248(b)(6) requires that the Board find that any proposed construction of transmission facilities be "consistent with the principles for resource selection expressed in that company's approved least cost integrated plan" prior to issuing a certificate of public good. BED and Green Mountain Power have presented evidence that the proposed construction comports with their most recently approved IRPs.

As this Board has noted in previous orders, VELCO has not been required by the Board to develop an IRP. However, in 2005, 30 V.S.A. § 218c(d) was passed into law as part of Act 61. Section 218c(d) includes requirements for a transmission-owning utility such as VELCO, which does not have a retail service territory, to prepare a transmission-system plan jointly with other electric companies that own or operate these facilities, after public hearings and opportunity for input by the distribution utilities, the state's Energy Efficiency Utility (the "EEU"), the DPS, and other entities. Section 218c(d) states that "[t]he objective of the plan shall be to identify the potential need for transmission system improvements as soon as possible, in order to allow sufficient time to plan and implement more cost-effective nontransmission alternatives to meet the reliability needs, wherever feasible." Act 61 also requires the distribution utilities to incorporate the transmission system plan into their own integrated resource plans. The 7081 MOU approved by the Board in June of 2007, sets forth a process to facilitate the planning process and objectives identified in Section 218c(d).

Petitioners' NTA analyses have been ongoing since 2000, in tandem with refinements to the Project. Alternatives have been fully evaluated and determined not to be viable or cost-effective alternatives to the Project. Petitioners are therefore seeking authority to construct

the necessary transmission improvements. I find that the Project is consistent with the principles for resource selection contained in BED's and Green Mountain Power's IRPs, and that the planning process and public outreach were undertaken consistent with the processes envisioned by the 7081 MOU, even though the Project, as a transition project, is not subject to all of the requirements of the 7081 MOU.

P. Compliance with Electric Energy Plan

[30 V.S.A. § 248(b)(7)]

497. The Project complies with the electric energy plan approved by the Department under 30 V.S.A. § 202. This finding is supported by findings 498 through 513, below.

498. Even if it were not in compliance with the Department's electric energy plan, there would exist good cause to permit the project. This finding is supported by the totality of the findings set forth in this Order.

499. The Department of Public Service ("DPS") recognizes the following in its Vermont Electric Plan dated January 19, 2005 (the "Plan"):

Modern society has come to depend on reliable electricity as an essential resource for national security, health and welfare, communications, finance, transportation, food and water supply, heating, cooling, lighting; computers and electronics; commercial enterprise; and even entertainment and leisure. In short, nearly all aspects of modern life are driven by electricity. Customers have grown to expect that electricity will almost always be available when needed at the flick of a switch. Most customers have also experienced local outages What is not expected is the occurrence of a massive outage on a calm, warm day. Widespread electrical outages, such as the one that occurred on August 14, 2003, are rare, but they can happen if multiple reliability safeguards break down. Such outages, in turn, produce considerable economic losses.

Mallory, Cecchini, Nolan, and Presume joint pf. at 4 (quoting the Plan at 7–1.)

500. Drawing from the State Energy Policy, the Plan establishes as a benchmark that, "to the greatest extent practicable . . . Vermont can meet its energy service needs in a manner that is adequate, reliable, secure and sustainable; that assures affordability and encourages the state's economic vitality, the efficient use of energy resources and cost effective demand side management; and that is environmentally sound" *Id.* (quoting the Plan at 1–5.).

501. The Plan recognizes the critical importance of an adequate and reliable transmission and distribution infrastructure as a means of handling peak demand:

To meet peak demands, . . . not only must utilities secure sufficient electric supplies to meet peak demands, they must be able to distribute them to customers over the network of transmission and distribution lines that cross the state. Therefore, Vermont's poles and wires network must be large enough to handle all of the electricity demanded.

Id. at 5–6 (quoting the Plan at 3–6).

502. By replacing the existing line along the 115 kV EAL corridor with two lines, and by adding the 34.5 kV line to connect the East Avenue substation to the to-be-upgraded McNeil substation, the Petitioners will increase the reliability of the transmission system in the most-populous and fastest-growing area of the State through redundancy in transmission lines and 115 kV to 34.5 kV substation transformers, while also increasing the capacity of the system in this area. *Id.* at 6.

503. Consistent with the Plan, the Project addresses the inadequacy and unreliability of the present system configuration. The level of risk inherent in the existing system is unacceptable and jeopardizes the economy, public health, and vital infrastructure. *See* findings under Sections 248(b)(2) and 248(b)(4), above.

504. The Project will provide a redundant delivery supply point to East Avenue so that power is not instantaneously lost for failure of critical facilities and to provide necessary reinforcement to the sub-transmission and distribution network in this area. LaForest pf. at 13; Litkovitz pf. at 4.

505. The business community in Chittenden County, Fletcher Allen Health Care, and the City Council for the City of Burlington have all endorsed the need for the Project to provide adequate and reliable electric service to Chittenden County. *See* findings 177–180, above.

506. The term "affordable" is expressed in the Plan in terms of ensuring that consumers are provided with electric service "at the least total cost to society." Roughly \$27.5M, or almost 64% of the Project's total cost, is eligible for regional cost treatment as pool transmission facility, which VELCO considers likely. This eligibility and likely designation will substantially reduce the cost of the transmission line and substation upgrades to Vermonters. Mallory, Cecchini, Nolan and Presume joint pf. at 6 (quoting from the Plan at 1–6).

507. The term "efficient" in the Plan references a general need to adequately explore and compare the Project to demand-side management load response, and other potential energy efficiency solutions. Petitioners have done this. *See* findings 139–161, above.

508. The Project is also "efficient" in the traditional sense, because it maximizes the use of existing utility corridors to provide adequate, reliable, energy to the Greater Burlington Area, without requiring major expenditures associated with creating new routes or acquiring new rights-of-way. In that regard, it is significant that the Plan directs as follows for transmission projects:

Where additional transmission capacity is required, the preferred method for increasing transmission capacity should be through the upgrading of existing facilities within existing transmission corridors.

Mallory, Cecchini, Nolan, and Presume joint pf. at 6 (quoting from the Plan at 8–3).

509. The term "safe" as used in the Plan takes into consideration the protection of public health and safety as part of planning. The Plan specifically recommends using the International Commission on Non-Ionizing Radiation Protection ("ICNIRP") guidelines as the standard for measuring EMF from transmission upgrade projects. *Id.* at 8 (citing the Plan at 7–35).

510. The EMF levels on the 115 kV and 34.5 kV line segments associated with the Project are projected to be substantially lower than the levels considered "unsafe" in the ICNIRP guidelines. *Id.* at 9; Valberg pf. at 31.

511. Concerning the "environmental soundness" of the Project, and especially with respect to the 115 kV line, the Petitioners are proposing to take substantial measures to reduce or altogether avoid impacts of the Project on the natural environment, including erosion control plans, careful pole placement, noise-mitigation measures, and specialized construction practices for sensitive areas. Mallory, Cecchini, Nolan, and Presume joint pf. at 10.

512. In addition to the more general goals outlined in the Plan, the Plan includes some specific goals, such as requiring VELCO to support and cooperate with others in regional transmission and distribution system planning. Mallory, Cecchini, Nolan, and Presume joint pf. at 10 (citing the Plan at 8–3).

513. The Project was evaluated within VELCO's 2006 Long-Range Plan study, and in addition, VELCO participated in the ASC that led to the identification of the Project as the best

of multiple upgrade options. Mallory, Cecchini, Nolan, and Presume joint pf. at 10; exh. PET 1.3.

Discussion

I conclude that the proposed Project is consistent with the Plan. This conclusion is based upon the foregoing findings of fact, including those incorporated from other relevant sections of this Proposal for Decision. As noted by this Board in its Order approving the Northwest Vermont Reliability Project, "the overriding goals in the . . . Plan 'to meet Vermont's electric needs in a manner that is efficient, adequate, reliable, secure, sustainable, affordable, safe and environmentally sound,' reflect the very factors that we evaluate under the various provisions of Section 248(b)." *In re: Northwest Vt. Reliability Project*, Docket No. 6860, Order of 1/28/05 at 210 n.211. I further conclude that, because the Project is required to meet a present and future need for reliable electric service, and is the most cost-effective option for doing so, even if the Project were determined not to be in compliance with the Plan, there would be ample good cause to approve it.

Q. Existing Transmission Facilities

[30 V.S.A. § 248(b)(10)]

514. The proposed Project can be served economically by existing or planned transmission facilities without undue adverse effect on Vermont utilities or customers. This finding is supported by findings 515 through 518, below.

515. The existing transmission and subtransmission network serving Chittenden County is not capable of reliably meeting Vermont's existing and future electrical needs. *See* findings 1 through 23, above.

516. The primary purpose of the proposed Project is to improve the reliability and adequacy of the existing transmission facilities serving Chittenden County. *Id.*

517. Studies indicate that the only adverse impact on existing facilities associated with the Project may occur in Phase II (not part of this Project), specifically the need to upgrade an existing 34.5 kV circuit breaker in the Green Mountain Power Gorge substation following

construction of a new VELCO Gorge substation. This breaker upgrade would be a relatively small cost and would not rise to the level of an undue adverse impact on Green Mountain Power or its ratepayers. Litkovitz pf. at 8.

518. Because a new VELCO Gorge substation is not before the Board in the instant proceeding, this potential impact need not be assessed at this time. *Id.* at 8.

IV. CONCLUSION

For the reasons set forth above, I conclude that the proposed transmission upgrades will promote the general good of the state, and recommend that the Project be approved, with the conditions included in the attached proposed Order and Certificate of Public Good.

This Proposal for Decision has been served on all parties to this proceeding in accordance with 3 V.S.A. § 811.

Dated at Montpelier, Vermont, this 28th day of May, 2008.

s/John P. Bentley
John P. Bentley, Esq.
Hearing Officer

V. BOARD DISCUSSION

In comments filed on May 22, 2008, the Petitioners noted three typographical errors and asked that they be corrected; we have made those non-substantive changes in the text of the Proposal for Decision. Further, we note that the reference to "Trinity College" in finding 172 should be taken to refer to the environs that formerly comprised the Trinity College campus.

The Petitioners also asked that we amplify the discussion of electromagnetic fields that the Hearing Officer included in the Proposal. The amplification is, generally, further quotation from the Board's decision in Docket 6860. However, we believe the findings and discussion already contained in the Proposal adequately address this issue, which was not contested in this docket, and we reject the proposed supplementary language.

VI. ORDER

IT IS HEREBY ORDERED, ADJUDGED AND DECREED by the Public Service Board of the State of Vermont that:

1. The findings and conclusions of the Hearing Officer are adopted.
2. The proposed Project, in accordance with the evidence and plans submitted in this proceeding, will promote the general good of the State of Vermont in accordance with 30 V.S.A. § 248, and a certificate of public good to that effect shall be issued with the conditions set forth below:

(a) Construction, operation, and maintenance of the proposed Project shall be in accordance with the evidence and plans submitted in this proceeding, and the findings and requirements set forth in this Order.

(b) Prior to proceeding with construction, Petitioners shall file, for the Board's approval, final construction plans for the Project, which Project plans shall conform substantially to the Project plans approved by the Order. Petitioners shall note any changes in the final plans from the plans approved by the Order and any affected party shall have two weeks to comment on any such changes from the date the plans are filed.

(c) Prior to proceeding with construction, Petitioners shall obtain all necessary

permits and approvals. Construction, operation, and maintenance of the proposed Project shall be in accordance with such permits and approvals.

(d) Petitioners shall conduct post-construction noise measurements at the East Avenue substation within 60 days of completion of the substation, and file the results with the Board and the parties. The Board shall retain jurisdiction to decide any issues associated with post-construction noise at the East Avenue substation.

(e) The Petitioners shall comply with all provisions of the agreements referenced below, which are approved in their entirety and are hereby incorporated into this Order:

- (i) Memorandum of Understanding⁹ dated October 16, 2007, among VELCO, the Agency of Commerce and Community Development Division for Historic Preservation ("DHP") and State Historic Preservation Officer ("SHPO" and, collectively with DHP, "ACCD");
- (ii) Memorandum of Understanding dated November 19, 2007, among Petitioners and the Vermont Department of Public Service; and
- (iii) Memorandum of Understanding dated February 25, 2008, among Petitioners, Winooski Valley Park District, and the City of South Burlington.

(f) Petitioners shall follow the mitigation measures as described in the Historic Sites Report discussed in Finding 426, above.

(g) Petitioners shall follow the procedures and agreements set forth in the letter from Petitioners marked as Exh. NR-REB-RP 1.

(h) Petitioners shall follow the procedures described on page 53 above:

If required, a stream alteration permit application will be applied for and a stream alteration permit will be issued prior to fording the Winooski River.

The conditions contained in the stream alteration permit will be followed for fording the Winooski River; all other crossings shall be as described in finding 241.

If a stream alteration permit for the access to the Gorge Island is required and issued, VELCO must notify the ANR stream alteration engineer by telephone before undertaking any change to the access. Any substantial changes for

9. That MOU has a termination clause, and VELCO must provide advance notice to the Board of the MOU's termination. In the event of termination the Board will convene a further proceeding to consider conditions to prevent undue adverse effect on archaeological historic sites.

access to the Gorge Island, if a stream alteration permit is required, must be presented in writing to the ANR stream alteration engineer for prior written approval.

Petitioners will be required to observe the ANR-approved erosion prevention and sediment control plans for the proposed Project in order to ensure that the banks of any watercourses return to a condition as close to their natural condition as possible.

(i) Petitioners shall abide by the requirements of the City of Burlington noise ordinance during their construction activities.

(j) The Board retains jurisdiction to review aesthetic mitigation measures post-construction and to require additional mitigation measures as the Board determines to be appropriate.

Dated at Montpelier, Vermont, this 29th day of May, 2008.

<u>s/James Volz</u>)	
)	
)	PUBLIC SERVICE
<u>s/David C. Coen</u>)	
)	BOARD
)	
)	OF VERMONT
<u>s/John D. Burke</u>)	

OFFICE OF THE CLERK

FILED: May 29, 2008

ATTEST: s/Susan M. Hudson
Clerk of the Board

NOTICE TO READERS: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Board (by e-mail, telephone, or in writing) of any apparent errors, in order that any necessary corrections may be made. (E-mail address: psb.clerk@state.vt.us)

Appeal of this decision to the Supreme Court of Vermont must be filed with the Clerk of the Board within thirty days. Appeal will not stay the effect of this Order, absent further Order by this Board or appropriate action by the Supreme Court of Vermont. Motions for reconsideration or stay, if any, must be filed with the Clerk of the Board within ten days of the date of this decision and order.